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April 18, 1961
Vol. 35, No. 4

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In this issue:

Chemistry
Z
7913
.458

Mechanism of Wear on Nonmetallic Materials. (PB 171 474)

Electron Physics of Traveling Wave Tube Devices. (PB 171 414)

Evaluation of Brazed Honeycomb Structures. (PB 171 408)

Influence of Environment on Ceramic Properties. (PB 171 398)

Heat Sinks: Materials. (PB 171 372)

High-Pressure Research in Metals and Ceramics. (PB 171 025)

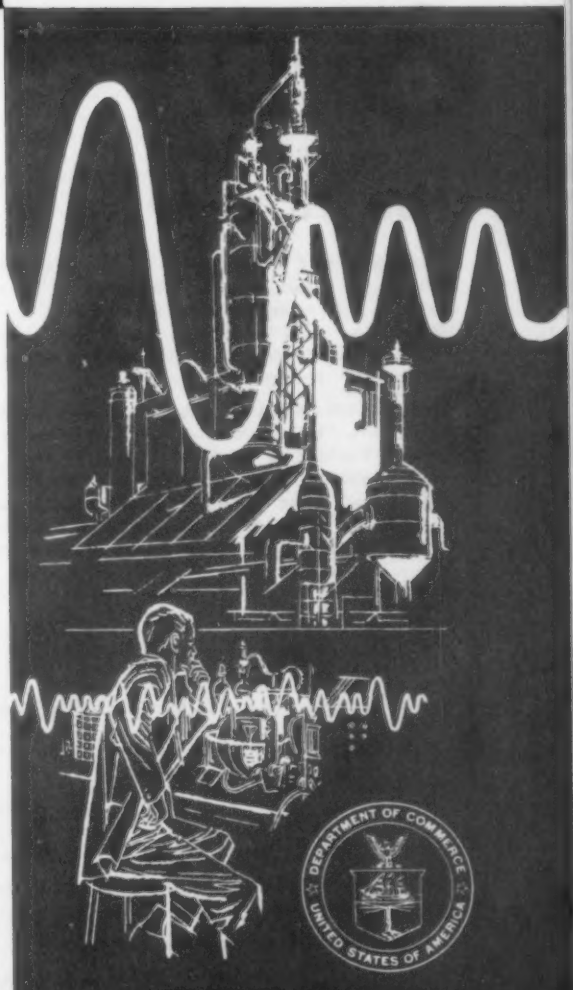
A Survey of Computer Programs for Chemical Information Searching. (PB 161 586)

Refractory Metals in Europe. (PB 161 233)

Stress-Corrosion Cracking: A Nontechnical Introduction to the Problem. (PB 151 103)

Methods of Measuring Emittance. (PB 161 228)

Complete list of printed reports begins on page iii



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CONTENTS

	Page
PRINTED REPORTS AVAILABLE FROM OTS ANNOUNCED IN THIS ISSUE	iii
BIBLIOGRAPHY	391
ASTRONOMY	391
Astrophysics	392
BEHAVIORAL SCIENCES	392
Personnel and Training	393
Psychology	394
BIOLOGICAL SCIENCES	396
Anatomy and Physiology	397
Biochemistry	400
General Biology	402
Microbiology	403
Pathology	403
Radiobiology	404
CHEMISTRY	405
Analytical Chemistry	405
Organic Chemistry	405
Physical Chemistry	406
EARTH SCIENCES	411
Climatology and Meteorology	411
Oceanography	413
Physics of the Atmosphere	414
ENGINEERING	416
Aeronautical Engineering	416
Civil Engineering	420
Electrical and Electronic Engineering	420
Ordnance, Missiles, and Satellite Vehicles	435
Sanitation and Safety Engineering	440
Ship Building	440
FOOD, HANDLING, AND PACKAGING EQUIPMENT	441
Food	441
Packaging	441
MACHINERY, FABRICATION, AND ACCESSORY EQUIPMENT	442
Engines and Propulsion Systems	442
Manufacturing Equipment and Processes	444
MATERIALS	445
Ceramics and Refractories	445
Fuels, Lubricants, and Hydraulic Fluids	447
Leather and Textiles	448
MATHEMATICS	449
Computing Devices	451
MECHANICS	452
Aerodynamics and Pneumatics	454
Hydrodynamics, Hydraulics, and Hydrostatics	457
METALLURGY	458
Ferrous Metals	459
Nonferrous (except light) Metals	460
Structural Metallurgy and Corrosion	460
NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY	462
Instruments and Installations	463
Nuclear Reactions	463
Radioactivity	464
PERSONNEL SUPPLIES AND PERSONAL EQUIPMENT	464
PHYSICS	465
Electricity and Magnetism	466
Electronics	466
Molecular Physics and Spectroscopy	467
Optics	468
Solid State Physics	469
Theoretical Physics	472
Thermodynamics	474
Wave Propagation	475
RESEARCH METHODS, TECHNIQUES AND EQUIPMENT	476
Photographic Equipment	478
SOCIAL SCIENCES	478
Documentation	479
MISCELLANEOUS	480
ATOMIC ENERGY COMMISSION REPORTS	481
General, Miscellaneous, and Progress Reports	481

Page

ATOMIC ENERGY COMMISSION REPORTS (con.)
Biology and Medicine 482
Chemical Separations Processes for Plutonium and Uranium 482
Chemistry 484
Controlled Thermonuclear Processes 486
Criticality Studies 486
Engineering and Equipment 487
Geology and Mineralogy 488
Health and Safety 488
Instruments 490
Isotopes--Industrial Technology 492
Isotope Separation 493
Mathematics and Computers 493
Metals, Ceramics, and Materials 493
Meteorology 499
Nuclear Explosions--Peaceful Applications 499
Particle Accelerators and High-Voltage Machines 499
Physics 500
Radiation Effects on Materials 506
Reactor Technology 507
Technology--Feed Materials 530
Waste Disposal and Processing 532

SOURCE INDEX I-1
SUBJECT INDEX I-5
NUMBER INDEX I-13

Page

482
482
484
486
486
487
488
488
490
492
493
493
493
499
499
499
500
506
507
530
532

I-1
I-5
I-13

PRINTED REPORTS AVAILABLE FROM OTS ANNOUNCED IN THIS ISSUE

Page

BEHAVIORAL SCIENCES

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(OTS SB-435) 10 cents 472

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on the golden hamster. Sep 60. 81p. (PB 171 367) $2.25 398
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cochlea. Aug 60. 12p. (PB 171 392) 50 cents 397

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Electron physics of traveling wave tube devices. July 60. 55p.
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Page

ENGINEERING (con.)

Exit taxiway locations. Sep 60. 24p. (PB 171 369) 75 cents 417
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Page

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Page

METALLURGY (con.)

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Hydrogen embrittlement of titanium alloys. Oct 60. 49p. (PB 171 394) $1.25 461
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Page

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photographic exposure. May 60. 18p. (PB 171 385) 50 cents 478

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Battelle Memorial Inst., Columbus, Ohio.
BIBLIOGRAPHY OF THE LIQUID-SOLID CYCLONE 1939 TO 1957, by O. F. Tangel, R. J. Brison, and D. A. Jacobs. [1958] 19p. 243 refs.
Order from LC mi$2.40, ph$3.30 PB 154 409

This report released for sale to the public 15 Feb 61.

To facilitate the use of this bibliography, the entries have been arranged into the following categories: (a) Theory and design, fluid flow, efficiency determination, and effect of operating variables, (b) Applications: (1) In mineral processing, (2) In the pulp and paper industry, (3) In the petroleum industry, (4) Miscellaneous, including chemical and food processing, (c) General, including review articles, bibliographies, books, and articles general in nature.

Diamond Ordnance Fuze Labs., Washington, D. C.
SEARCHING THE LITERATURE FOR TRANSDUCER INFORMATION. PART II. A SURVEY OF THE FIELD, by J. Pearlstein. 1 Dec 60, 118p. 138 refs. TR-898.
Order from LC mi$6.00, ph$18.30 PB 153 505

A survey is presented of current knowledge with respect to the availability, application, design, calibration, and testing of transducers. The references covered are restricted to the following forms of literature: bibliographies, tutorial papers, surveys (including state-of-the-art studies), guides, handbooks, monographs, treatises, and comprehensive catalogs of commercially available transducers. The items are arranged under the following principal headings: Transducers and Instrumentation in General; Commercial transducers; Effects, Principles, and Phenomena; Basic Materials; and Measurands (quantities, magnitudes, or phenomena that may be measured, observed, or sensed). Twenty eight tables pertaining to the use, performance, and availability of transducers are included. (Author) (See also PB 161 320)

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ANTIMONY, BISMUTH, GALLIUM, INDIUM, SELENIUM, AND TELLURIUM. Sep 60, 16p. 266 refs. OTS Selective Bibliography SB-438.
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ASTRONOMY

Lincoln Lab., Mass. Inst. of Tech., Lexington.
A COMPUTER PROGRAM FOR PROCESSING SIGNALS RECEIVED IN RADAR ASTRONOMY EXPERIMENTS, by P. L. Fleck, Jr. and T. J. Goblick. Rept. on Contract AF 19(604)7400. 14 Oct 60, 21p. 6 refs. 34G-0005; AD-245 549.
Order from LC mi$2.70, ph$4.80 PB 152 827

In 1958 and 1959, this laboratory attempted to obtain radar reflections from the planet Venus. The received data were analyzed on an IBM 709 Data Processing machine. This report describes the General Detection Program (which was written mainly in FORTRAN) that was used for the data processing.

Astrophysics

Cornell U. School of Electrical Engineering, Ithaca, N. Y.
CORRELATOR FOR NOISE SIGNALS WITH APPLICATION TO 200 MC/S POLARIMETER, by Kenji Akabane. Technical rept. no. 3 on Contract Nonr-401(27). 15 Jan 60, 45p. 9 refs. Research rept. EE 461; AD-235 447.
Order from LC mi$3.30, ph$7.80 PB 152 872

The principle of a noise correlator that gives the amplitude of the cross-correlation function between two noise signals is discussed. The amplitude of the cross-correlation function is directly given by the output of the correlator. The minimum detectable cross-correlation function is also calculated for the correlator. One example of solar observation by the 200 mc polarimeter is illustrated. (Author)

Maryland U., College Park.
ARTIFICIAL MODIFICATION OF THE EARTH'S RADIATION BELT, by Fred Singer. Rept. on Contract AF 18(600)1038. [1958] 31p. 30 refs. AFOSR TN-58-952, AD-205 345.
Order from LC mi$3.00, ph$6.30 PB 150 722

Presented at the Fifth Annual Meeting of the American Astronautical Society held in conjunction with the 125th Meeting of the American Association for the Advancement of Science, Washington, D. C., December 27-31, 1958.

Minnesota U. School of Physics, Minneapolis.
TABULATION OF HIGH ALTITUDE RADIATION DATA FOR THE IGY PERIOD, by John R. Winckler. Technical rept. no. CR-28 on 2.12 Cosmic Ray Intensity at High Altitude, Contract [Nonr-710(19)]. Apr 60, 199p. 1 ref. AD-238 769.
Order from LC mi$8.70, ph$30.30 PB 148 496

This compendium contains the numerical data obtained on a series of high altitude balloon flights conducted from Minnesota and from a limited number of field stations during the IGY period. The normalized ionization chamber rates and the normalized Geiger counter rates are given for all of the flights. The data obtained during ascent of the balloon are given in graphical form and include also the ratio: (ion rate/counter rate) as a function of balloon pressure height. The data obtained at ceiling altitude are given in tabular form averaged over 15-min. intervals, approximately. The geographic latitudes and longitudes, obtained partly from radio direction equipment (GMD) but mainly from aerial camera photographs, are included in the constant level portion of the data. (Author)

BEHAVIORAL SCIENCES

American Inst. for Research [Pittsburgh, Pa.]
HUMAN FACTORS METHODS FOR SYSTEM DESIGN, by John D. Folley, Jr., James W. Altman (ed.) and others. Rept. on Contract Nonr-2700(00). 1960, 392p. 234 refs. AIR-290-60-FR-225; AD-232 646.
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- Evaluation of personnel proficiency

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American Power Jet Co., Ridgefield, N. J.
HUMAN ENGINEERING FACTORS AFFECTING ARCTIC AIRCRAFT MAINTENANCE. DATA SOURCES AND PROJECT BIBLIOGRAPHY. Rept. on Contract AF 41(657)41. Dec 57, 66p. 566 refs. Technical note AAL-TN-57-12.
Order from LC mi$3.90, ph$10.80 PB 153 547

The scope of the current study of human factors affecting arctic maintenance encompasses the basic maintenance problem as modified by environmental stress. Accordingly, data pertinent to the problem are of three general sorts: (1) maintenance experience, (2) the nature of the arctic problem, and (3) applicable psychological and physiological factors.

Army Ordnance Human Engineering Lab., Aberdeen Proving Ground, Md.
STUDIES ON THE KINETIC DEPTH EFFECT AS A MEANS FOR PRESENTING THREE-DIMENSIONAL INFORMATION: II. EFFECTS OF VARYING ANGLE AND LENGTH OF A TWO-DIMENSIONAL FORM, by Charles Fried and James A. Meadows. Dec 60, 36p. 4 refs. Technical memo. 18-60.
Order from LC mi$3.00, ph$6.30 PB 153 470

An attempt was made to correlate the amount of length and angle changes of shadow projections of rotating wire rods with the ease with which the depth impression of the Kinetic Depth Effect is elicited. This attempt was based on earlier findings of Wallach and O'Connell, that the stimuli for the Kinetic Depth Effect are length and angle changes of lines making up a moving form. The attempt was not successful as all shadow transformations presented to the subjects in this study produced the impression of a figure rotating in space. Suggestion is offered that further thought be given to determining the stimuli for the Kinetic Depth Effect illusion. (Author) (See also PB 146 160)

Personnel and Training

Adjutant General's Office, Washington, D. C.
ABSTRACTS OF PRB RESEARCH PUBLICATIONS FY 1960, by Arthur J. Drucker and Emma E. Brown. Aug 60, 28p. 47 refs. PRB Technical research note 109.
Order from LC mi$2.70, ph$4.80 PB 153 440

Air Force Missile Development Center, Holloman AFB, N. Mex.
HUMAN SCIENTIFIC AND TECHNICAL CAPABILITIES AT HOLLOMAN AIR FORCE BASE, THEIR ORIGINS AND DEVELOPMENT, by Theodore Saloutos (U. of California, Los Angeles). Sep 60, 129p.
Order from LC mi$6.30, ph$19.80 PB 152 686

Contents:
Part I: Development of Holloman Scientific and Technical capabilities, to July 1958
The government service, scientists and engineers, and the problems of recruiting
The foreign-born scientists and engineers
The native-born scientists and engineers
Educational programs
Salaries of scientists and engineers
Expectations and frustations; An inquiry into the problems of morale
Part II: Scientific and Technical capabilities July 1958-June 1959
The office of the chief scientist
Directorate of advanced technology
Directorate of aircraft missile test
Employees in miscellaneous categories
Educational backgrounds of 260 commissioned officers stationed at Holloman as of 30 June 1959

Applied Psychological Services, Wayne, Pa.
POST-TRAINING PERFORMANCE CRITERION DEVELOPMENT AND APPLICATION. A FURTHER STUDY INTO TECHNICAL PERFORMANCE CHECK LIST CRITERIA WHICH MEET THE THURSTONE AND GUTTMAN SCALABILITY REQUIREMENTS, by Arthur I. Siegel, Douglas G. Schultz, and Stephen Benson. Rept. on Contract Nonr-2279(00). Mar 60, 85p. AD-234 691.
Order from LC mi$4.80, ph$13.80 PB 153 779

A test was made of the hypothesis that the technical skills involved in the work of aviation machinist's mates are scalable in the same sense as are attitudes and various psychophysical phenomena. Results indicate that: (1) skills involved in the Naval rate of aviation machinist's mate are scalable by the Thurstone method of equal-appearing intervals; (2) the skills form a Guttman scale from the point of view of the amount of inservice training required for achieving proficiency; (3) the Naval attitudes of the aviation machinist's mate, as expressed in a self-report questionnaire, do not relate strongly to proficiency in the fleet; (4) the aptitude tests commonly administered to all personnel entering the Navy correlate moderately highly among themselves and with inservice school success but had low correlations with job performance as measured; and (5) it is possible to use attitudinal inventory scores effectively in combination with other variables to predict post-training fleet performance. (Author)

Arctic Aeromedical Lab., Ladd AFB, Alaska.
SURVEY OF HUMAN ADJUSTMENT PROBLEMS IN THE NORTHERN LATITUDES. CRITICAL FACTORS UNDERLYING THE DECISION TO EXTEND OR NOT EXTEND THE ALASKAN DUTY TOUR, by Frederick H. Rohles, Jr. Nov 53, 48p. 6 refs. Proj. no. 22-1301-0003. rept. no. 1, series 2.
Order from LC mi$3.30, ph$7.80 PB 153 329

The ten most frequently reported reasons why the single airmen did not desire to extend their duty tours are presented in order of reporting frequency: (1) lack of recreation; (2) dislikes weather; (3) no feminine companionship; (4) high prices; (5) job dissatisfaction; (6) tour of duty too long; (7) dislikes city; (8) poor base facilities; (9) cabin fever; and (10) desires stateside duty. The ten most frequently reported reasons for extending the duty tour given by the single airmen are presented in order of reporting frequency: (1) job satisfaction; (2) saving money; (3) general like of Alaska; (4) likes outdoor activities; (5) has friends here; (6) likes weather; (7) homesteading; (8) make rank faster; (9) pioneer spirit; and (10) plans to get married.

Arctic Aeromedical Lab., Ladd AFB, Alaska.
A SURVEY OF REACTION OF ARMY AND AIR FORCE PERSONNEL, LADD AIR FORCE BASE, TOWARD CERTAIN ASPECTS PERTINENT TO THE DEFENSE OF THEIR INSTALLATION (POST EXERCISE "DUTCH DOOR") by Anthony Debons. Special project. Feb 51, 25p.
Order from LC mi$2.70, ph$4.80 PB 153 323

This report concerns the result of a survey pertaining to personnel response to various aspects of the defense program. It is an attempt to appraise: (a) Personal evaluations of certain pertinent phases of the defense program. (b) The extent of personal stability in terms of acquired sense of security as related to: (1) Leadership; (2) Equipment; (3) Training; and (4) Knowledge of the defense assignment.

Personnel Lab., Wright Air Development Div., Lackland AFB, Tex.
FAMILIARITY EFFECTS IN EVALUATIVE JUDGMENTS, by Joseph M. Madden. Nov 60, 12p. 11 refs. WADD-TN-60-261.
Order from LC mi$2.40, ph$3.30 PB 153 853

This report is one of a series dealing with rater bias in job evaluation. It was found that the more familiar the rater is with the job being evaluated, the higher his rating is likely to be. This effect was observed for five of the 14 job evaluation rating factors used: Adaptability, Decision-Making, Managerial and Supervisory, Mental Work, and Working Conditions. Methods are suggested for controlling the familiarity effect in the Air Force job evaluation system. (Author)

Personnel Lab., Wright Air Development Div., Lackland AFB, Tex.
PREDICTION OF UNSUITABILITY DISCHARGES, by Wayne E. Fisher, Joe H. Ward, Jr. and others. Oct 60, 21p. 6 refs. WADD-TN-60-260.
Order from LC mi$2.70, ph$4.80 PB 153 852

An equation was devised to provide recruiters with a convenient device for estimating the quality of a prospective recruit from three predictors: age, education, and aptitude score. This report describes the development of the equation and illustrates its effectiveness in predicting unsuitability discharges. It provides a convenient dial computer for estimating probability of unsuitability discharge. (Author)

Science Research Associates, Inc., Chicago, Ill.
THE DEVELOPMENT OF COLLEGE ACHIEVEMENT TESTS (FORMS 3 AND 4) FOR NAVY OFFICER SELECTION BATTERY, by Jean Maier and Robert Perloff. Rept. on Contract Nonr-2281(00). Apr 60, 19p. 1 ref. BuPers Technical Bulletin 60-3.
Order from LC mi$2.40, ph$3.30 PB 148 771

Two new Forms of the academic achievement section of the Officer Selection Battery (OSB) were constructed. Each of these Forms (Forms 3 and 4) include sub-tests in four subject-matter areas: (a) English, (b) Mathematics, (c) Science, and (d) History and Social Studies. The new Forms were to be comparable to Form 1 of this section of the OSB, but improvements thought to increase their efficiency were made.

Psychology

Arctic Aeromedical Lab., Ladd AFB, Alaska.
RELATIONSHIPS BETWEEN CERTAIN SCORES ON THE MINNESOTA MULTIPHASIC PERSONALITY INVENTORY AND THE MINNESOTA PERSONALITY SCALE, by Ernest L. McCollum. [1959] 2p.
Order from LC mi$1.80, ph$1.80 PB 153 322

The Minnesota Personality Scale morale scores and the Minnesota Multiphasic Personality Inventory depression scores yielded a correlation coefficient of -.292, the Minnesota Personality Scale social adjustment scores and the Minnesota Multiphasic Personality Inventory psychopathic deviate scores yielded a correlation coefficient of -.125, and the Minnesota Personality Scale emotionality scores and the Minnesota Multiphasic Personality Inventory hypomanic scores yielded a correlation coefficient of -.416.

Arctic Aeromedical Lab., Ladd AFB, Alaska.
TWO STUDIES ON TEMPERATURE AND MOTOR ABILITY. THE EFFECT OF TEMPERATURE ON SERIAL-DISCRIMINATIVE RESPONSES. THE EFFECT OF TIME AND TEMPERATURE ON MOTOR ABILITY, by Frederick H. Rohles, Jr. [1952] 25p. 28 refs. Proj. no. 22-0601-0002, rept. no. 1.
Order from LC mi$2.70, ph$4.80 PB 153 321

For the adjustment period of thirty minutes, the best performance in terms of speed and errors was obtained by the group which was retested at 60°. The many variables which have to be considered in this problem are: (1) temperature; (2) humidity; (3) air movement--wind; (4) exposure time; (5) degree and type of activity; (6) clothing; (7) body temperature--both skin and rectal; (8) vasomotor responses; (9) basal metabolic rate; (10) diet; and (11) acclimatization and adaptation. These factors continually interact to determine the heat balance of the organism.

Bryn Mawr Coll., Pa.
BODY SPACE: TACTILE-KINESTHETIC SCHEMA, by Robert S. Davidon. Technical note no. 1 on Contract AF 46(638)726. 30 Sep 60, 11p. 6 refs. AFOSR-TN-60-1355.
Order from LC mi$2.40, ph$3.30 PB 153 424

The first of a series of psychophysical studies to define tactile-kinesthetic spatial relationships within and around the body for normal subjects. The subjects judged when two successive points touched on one arm were phenomenally as far apart as those of a standard on the other palm or on different parts of the arm. Non-linear relationships were indicated. A change in position of the arm affected perceived distance. (Author)

Educational Testing Service, Princeton, N. J.
THE NEGATIVE HYPERGEOMETRIC DISTRIBUTION WITH PRACTICAL APPLICATION TO MENTAL TEST SCORES, by Frederick M. Lord. Rept. on Contract Nonr-2752(00). Apr 60, 22p. 11 refs. AD-237 968.
Order from LC mi$2.70, ph$4.80 PB 148 018

A rarely mentioned distribution, negative hypergeometric (H), is found from theoretical consideration to be appropriate in cases for fitting observed distributions of test scores. Only the mean and variance of the observed distribution are used for fitting, even though the distribution be highly skewed. Six numerical examples fitting H to actual mental test data are presented for illustrative purposes. Properties of H are outlined both from a theoretical and from a practical viewpoint, with the hope of facilitating the general use of this distribution. (Author)

Harvard Graduate School of Business Administration, [Cambridge, Mass.]
THE EFFECTS OF AUDIENCES ON COMMUNICATORS, by Raymond A. Bauer and Ithiel de Sola Pool. Final rept. on Contract AF 49(638)486. Sep 60, 146p. AFOSR TR-60-129.
Order from LC mi$7.20, ph$22.80 PB 153 287

This report deals primarily with various problems and ideas suggested by, or related to, the "audience effect" findings of the Zimmerman-Bauer experiment. The personality questions and techniques for discovering communicators' reference groups which had been developed in the preliminary exploratory work were tested in pilot studies conducted at Wellesley in the fall of 1958, and the spring of 1959. The personality and reference group questionnaires, which were developed as a result of the pilot studies, were done in preparation for a full-scale experiment on the interpersonal variability in audience effect. This study was an attempt to replicate the Zimmerman-Bauer finding ("audience effect") and to account for individual differences in memory by correlating degree of audience effect with three factors: own attitude toward the

issue, attitude of one's reference groups, and several personality variables. In general, the results were complex, and confusing. Although many of the studies of the audience effect had found that communicators attempted to "please" an audience, the theoretical position outlined by Bauer had anticipated the possibility that some communicators might not want to please an audience, and hence would remember more of the unpleasant than pleasant facts. In order to test this proposition, a full-scale experiment was conducted at the Harvard Business School in spring 1960. The findings of this experiment were positive. Degree of "audience effect" was found to be related to the subject's own statement as to how far one should go toward "pleasing" a client. Studies are also reported which represent attempts to: (1) investigate the effect of professional training and experience in journalism on the degree of "audience effect" shown; and (2) explore the audience effect on creativity of writers. (Author)

Human Factors Research, Inc., Los Angeles, Calif.
AN EXPLORATORY STUDY OF THE CORRELATES OF VIGILANCE PERFORMANCE, by James J. McGrath, Albert Harabedian, and Donald N. Buckner. Technical rept. no. 4 on Human Factor Problems in Anti-Submarine Warfare, Contract Nonr-2649(00). Feb 60, 59p. 16 refs. AD-234 087.
Order from LC mi$3.60, ph$9.30 PB 153 126

Effort was directed toward ascertaining the types of behavioral measures that would be promising predictors of vigilance performance. Tests measuring clerical abilities appeared to be promising predictors of the amount of decrement in detection performance suffered by individuals during watch, but did not appear to predict the overall performance levels. Performance on an auditory vigilance task was more predictable from psychological test scores than performance on a visual vigilance task. Qualitative differences in vigilance performance (sleeping vs. not sleeping on watch) were more predictable from psychological test scores than quantitative differences in vigilance performance. There was a significant correlation between brightness discrimination threshold and performance on a visual vigilance task. Subjects detected fewer signals when they reported feelings of tiredness than when they reported feeling rested. Feelings of restlessness increased from week to week during the course of the experiment. The percentage of signals detected on watch was positively related to the amount of sleep the subject obtained the night before watchstanding. The subjects' general attitudes toward the experiment were not related to their performances on watch. But, there was a significant relationship between task preference (auditory vs. visual) and task performance such that performance was better on the preferred task.

Human Factors Research, Inc., Los Angeles, Calif.
THE PROBABILITY OF SIGNAL DETECTION IN A VIGILANCE TASK AS A FUNCTION OF INTERSIGNAL INTERVAL, by Albert Harabedian, James J. McGrath and Donald N. Buckner. Technical rept. no. 3 on Human Factor Problems in Anti-Submarine Warfare, Contract Nonr-2649(00). Feb 60, 35p. 20 refs. AD-234 086.
Order from LC mi$3.00, ph$6.30 PB 153 141

Fifty-four students at the U. S. Fleet Sonar School, San Diego, stood 2-1 hr watches a day, 4 days a wk, for 4 wk. Half of the watches were on a visual and half were on an auditory detection task. The subjects' task was to detect small intensity changes (signals) in an intermittent light or tone, these changes occurring at varying time intervals. Two signal rates were used, a mean of 6 and of 30 signals per hr. Each subject stood 10 low signal rate watches and 4 high signal rate watches for each sensory mode. In this study, sensory mode of signal presentation was ignored, but intersignal interval as the independent variable was treated separately for the 2 signal rates. The intersignal interval was identified in 3 ways: the amount of time elapsed since (1) the presentation of the previous signal, regardless of whether that signal was detected (occurrence of the previous signal as the referent); (2) the presentation of the last signal that was detected (detection of the previous signal as the referent); and (3) the presentation of the last signal that was missed (missing the previous signal as the referent). (Author)

Illinois U., Urban.
SOCIAL ADJUSTMENT AND INTERPERSONAL PERCEPTION, by Warren Smith, rev. by J. McV. Hunt. Separate technical rept. no. 1 on Interpersonal Perception and Interpersonal Relationships in Therapeutic Counseling, Contract Nonr-1834(11). 1 Feb 60, 85p. 125 refs.
Order from LC mi$4.80, ph$13.80 PB 153 168

This study was undertaken to investigate (1) whether socially adjusted persons assume greater similarity than do the socially maladjusted, (2) whether this greater assumption of similarity is general and occurs for a variety of other "persons," or (3) whether the degree of assumed similarity is a product of the degree to which the judge accepts and feels warmth toward the person judged. (Author)

Institute for Applied Experimental Psychology, Tufts U., Medford, Mass.
HEAD AND EYE TRACKING IN RESPONSE TO VELOCITY AND ACCELERATION INPUTS, by Philip B. Sampson, Edwin H. Elkin and others. Final rept. on Contract Nonr-494(16). Apr 60, 52p. 21 refs. AD-237 445.
Order from LC mi$3.60, ph$9.30 PB 147 533

A study was conducted to find out how well visual tracking could take place when both the head and eyes were free to follow moving targets and to discuss the relevance of the findings to the notion of using the eye as a control mechanism. The target used in this experiment swung horizontally about the subject at three different velocities (30, 60, and 90°/sec) and three accelerations (5, 20, and 45°/sec.^{2}). The tracking error record obtained indicated that the eye was able to track the targets within the same tolerances reported for eye tracking when the head was fixed. In addition there was the suggestion that by permitting both head and eye movements, higher velocities could be tracked than by the eyes alone. A reasonably constant head lead angle was found for the constant velocity inputs which varied with the magnitude of the input. Various implications of this finding were discussed. An electric circuit analog was developed for part of

the data and used to predict head and eye output in response to acceleration inputs, using constants derived from the velocity input data. The agreement between the obtained and the predicted function appeared promising. (Author)

Mississippi Southern Coll., Hattiesburg.
RESEARCH ON PSYCHOLOGICAL PARAMETERS OF SOUND, by Robert W. Peters. Rept. on Contract AF 33(616)3644. Feb 60, 65p. 83 refs. WADD Technical rept. 60-249; AD-240 814.
Order from OTS $1.75 PB 171 403

Experimental approaches to the determination of psychological parameters for complex sounds are discussed and relevant studies are summarized. The results of a series of experiments which were conducted treating the problem of parameters for complex sounds are included in this report. The studies involved language of auditory experience, scaling of auditory stimulus sets on equal-interval scales, paired-comparisons scaling, scaling by direct magnitude estimations, observer generated scales, multidimensional scaling of groups of sounds, and changes in auditory perception under constant stimulation. The results of the various studies indicated that the most promising approach for the study of parameters of complex sounds was the multidimensional scaling model. In a pure tone study this scaling model isolated the expected dimensions, pitch and loudness. In the scaling of complex sounds, for several stimulus sets evaluated, between three and six dimensions appeared to emerge. (Author)

Psychological Lab., U. of Southern California [Los Angeles]
THE EVALUATION OF SELECTED INTELLECTUAL FACTORS BY CREATIVE RESEARCH SCIENTISTS, by Myron S. Allen, J. P. Guilford, and P. R. Merrifield. Rept. no. 25 on Studies of Aptitudes of High-Level Personnel, Contract Nonr-228(20). Apr 60, 4 refs. AD-237 755.
Order from LC mi$2.40, ph$3.30 PB 148 007

A new technique was devised for making a preliminary survey of the relative importance of various intellectual factors for creative research scientists as the scientists themselves view those factors. Twenty-eight of the 46 known factors were selected by the investigators, eliminating those thought to be of little importance or relevance. A commonly worded definition and an example of a mental activity thought to involve the factor were written for each factor. These 28 factors were rated by 35 well-recognized scientists and engineers and by 50 non-scientists, as well as by other special groups. In general, the factors were rated in the same rank order by the two major groups, with a correlation of .87. Differences in ranks for some of the factors were marked only for a few factors and for special groups. As a group, divergent-production factors were not rated as high as expected in either major group but some of them were ranked higher by the non-scientist group. The scientists rated factors in the product category of transformations highest, particularly the redefinition factors, which are also in the convergent-production category. It was concluded that the transformation factors deserve recognition as potential contributors to creative work. (Author)

Psychological Lab., U. of Southern California [Los Angeles]
THE STRUCTURE OF INTELLECT MODEL: ITS USES AND IMPLICATIONS, by J. P. Guilford and P. R. Merrifield. Rept. no. 24 on Studies of Aptitudes of High-Level Personnel, Contract Nonr-228(20), continuation of Contract N6onr-238(10). Apr 60, 27p. 40 refs. AD-237 754.
Order from LC mi$2.70, ph$4.80 PB 148 006

A resume is presented of the steps by which the conception of the structure of intellect developed. More rigorous definitions are presented for the new concepts that arose in connection with the model. The model of the structure of intellect is now the source of ideas for general psychological theory, and factorial investigations are directed toward testing whether unknown unique abilities that are predicted by the model do, in fact, exist as distinguishable unities. The theories of learning and of thinking and problem solving, as generated by the model, are discussed.

Rochester U., N. Y.
SOME STUDIES OF THE INFLUENCE OF FILMS ON MOOD AND ATTITUDE, by Vincent Nowlis. Technical rept. no. 7 on Research Program on Mood and Attitude Change, Contract Nonr-668(12). 6 Jan 60, 16p. 24 refs. AD-231 247.
Order from LC mi$2.40, ph$3.30 PB 152 881

A series of studies were reviewed in which documentary films and similar materials were used to produce changes in mood and in attitude. A theoretical discussion of mood was presented together with the results of 7 factor analytic studies of the major dimensions of verbal report of mood. A short Mood Adjective Check list was found to be a useful instrument for quantifying changes in mood as induced by films and other experimental operations. Concomitant with changes in mood were congruent changes in: (1) readiness to accept a reasonable recommendation which is part of a mood-inducing communication; (2) attitude toward a target presented in an anger-arousing message; (3) the desirability of consumer products, the evaluation of certain affective goals, and the perceived utility of the consumer products in achieving these goals; (4) self-perception and person perception; and (5) the subjective estimate of the probability of uncertain future events. These results cannot be explained on the basis of mood theory in its present status. With respect to the topic of this symposium, they do suggest that this kind of communication can have tremendous influences on the momentary emotional and cognitive state of the member of the audience, an influence which may be far beyond the intent of the producer of the film. (Author)

BIOLOGICAL SCIENCES

Army Chemical Research and Development Labs., Army Chemical Center, Md.
THE EFFECT OF BORON HYDRIDES ON ISOLATED CAT PAPILLARY MUSCLE, by Edmund F. Murtha. Sep 60, 9p. 1 ref. CRDLR 3034; AD-245 202.
Order from LC mi$1.80, ph$1.80 PB 153 174

The cardiovascular system is affected during intoxication with the boron hydride fuels of the HEF-3 and HiCal-3 classes. This investigation was conducted to determine whether or not these compounds can cause a direct cardiotoxic effect. It was found that: (1) the boron hydride fuels of the HEF-3 and HiCal-3 classes can cause marked weakening of the isolated papillary muscle of the cat; and (2) the direct cardiotoxic effect of these compounds may be responsible for some of the cardiovascular alterations which occur in intact cats and dogs during boron hydride intoxication. (Author)

Copenhagen U. (Denmark).
INFLUENCE OF THE CAUDATE NUCLEUS IN THE MOTOR SPHERE (I); ANALYSIS OF THE UNIT ACTIVITY OF THE CAUDATE NUCLEUS (II); THE ROLE OF THE CAUDATE NUCLEUS IN CONDITIONED AVOIDANCE BEHAVIOR IN CATS (III), by A. Mosfeldt Laursen. Final technical rept. for 1 Nov 59-31 Oct 60 on Contract DA 91-591-EUC-1314. [1960] 12p. 14 refs.
Order from LC mi$2.40, ph$3.30 PB 153 468

Michigan State [U.] East Lansing.
EDIBLE PLANT FIELD WORK FOR SUMMER OF 1954, by Quentin Jones. Dec 56, 31p. Technical note AAL-TN-56-18.
Order from LC mi$3.00, ph$6.30 PB 153 524

The area covered was confined to the interior of Alaska with particular emphasis on the highlands and active flood plains.

Anatomy and Physiology

Aerospace Medical Div., Wright Air Development Div., Wright-Patterson AFB, Ohio.
STUDIES ON THE ENDOLYMPHATIC DC POTENTIAL OF THE GUINEA PIG'S COCHLEA, by Edward A. Rice and Edward W. Shinabarger. Rept. on Acoustic Energy Control. Aug 60, 12p. 9 refs. WADD Technical rept. 60-162.
Order from OTS $0.50 PB 171 392

The effect of loud sound on the endolymphatic DC potential was studied in both normal and hypoxic animals. When the integrity of the cochlea wall was maintained, the endolymphatic DC potential decreased 5 millivolts with the onset of sound (1000 cps at below 140 db) and recovered immediately when the sound was terminated. At intensities of 140 db and above, the DC potential irreversibly decreased. The effect of sound on the DC potential survived the life span of the post mortem microphonics. The positive DC potential returned on terminating hypoxia. Oxygen deprivation resulted in the DC potential decreasing before the microphonics. The possible significance of these findings to the physiology of hearing is discussed. (Author)

Arctic Aeromedical Lab., Ladd AFB, Alaska.
CARDIOVASCULAR RESPONSE TO HYPOTHERMIA. EFFECT OF COLD ACCLIMATIZATION, by Benjamin G. Covino and William R. Beavers. Jan 58, 17p. 12 refs. Technical rept. 57-27.
Order from LC mi$2.40, ph$3.30 PB 153 369

The process of cold acclimatization has been the basis for numerous physiological investigations. Information gathered from such studies is of obvious applicability to individuals operating in arctic regions. The present program was initiated in order to evaluate the effect of prolonged cold exposure on the cardiac response to acute severe hypothermia. The greatest hazard in profound hypothermia is the occurrence of ventricular fibrillation. In nonacclimatized control animals rendered hypothermic, the incidence of ventricular fibrillation was 96%. Following 1 to 4 weeks of continuous exposure to an environmental temperature of from 0° to -40° C., the frequency of this fatal cardiac abnormality was reduced to 9%. This beneficial effect of cold acclimatization was not ascribable to a direct effect on the hypothermic myocardium, since no difference in ventricular fibrillary threshold was observed between acclimatized and nonacclimatized animals. Thus, extrinsic cardiac factors are believed responsible for the antifibrillary action of cold acclimatization. (Author)

Arctic Aeromedical Lab., Ladd AFB, Alaska.
THE EFFECT OF PROLONGED COLD EXPOSURE ON THE IN VITRO RESPIRATION AND ANAEROBIC GLYCOLYSIS OF RAT LIVER, by John P. Hannon. June 57, 17p. 12 refs. Technical note AAL-TN-57-4.
Order from LC mi$2.40, ph$3.30 PB 153 545

Liver slices were prepared from rats that had been exposed to cold (5 ± 1°C.) for intervals of 2, 4, 6 or 9 weeks, and assays were made for respiratory rate and the rate of anaerobic glycolysis. The results of the respiration experiments indicated the first 4 weeks' cold exposure was associated with increasing QO_2 values, whereas exposure longer than 4 weeks was associated with QO_2 values that returned toward the control value. The results indicated further that the exact nature of the substances being metabolized in the conventional tissue slice experiment was unknown. The results of the anaerobic experiments indicated the rate of anaerobic glycolysis decreased progressively as the duration of cold exposure was increased. (Author)

Arctic Aeromedical Lab., Ladd AFB, Alaska.
THE METABOLIC AND BODY TEMPERATURE RESPONSE OF MEN TO AN ACUTE COLD STRESS BEFORE AND FOLLOWING AN ARCTIC BIVOUAC, by Donald W. Rennie and Thomas Adams. July 58, 30p. 36 refs. Technical rept. 57-37.
Order from LC mi$2.70, ph$4.80 PB 153 373

The metabolism and body temperatures of six subjects were recorded during a standardized cold test before and following a 24-day arctic winter bivouac in order to determine if any changes, which might be ascribed to living in a cold environment, took place in their thermoregulatory response. The body heat debt, total body heat loss, tissue and environmental insulation

and blood flow to certain skin areas were estimated from these data. Basal metabolism and thyroid function using I^{131} uptake were also measured in each subject before and following the bivouac. No change in basal metabolism of I^{131} uptake was noted in any subject following the field exposure. There were significantly higher skin temperatures of the arms, hands, lower legs, and feet at the completion of the post-bivouac test when compared with the pre-bivouac values. The temperatures of other skin areas and the rectal temperature were identical from one test period to another. The warmer extremity temperatures indicate a relatively reduced vascular constriction in response to cold in the limbs of the acclimatized subjects. Acclimatization to the degree of chronic cold to which these men were exposed was localized to the heat distribution function of the peripheral vasculature. (Author)

Arctic Aeromedical Lab., Ladd AFB, Alaska.
HYPOTHERMIA, by Raymond J. Hock and Benjamin G. Covino. Dec 56, 15p. Technical note AAL-TN-56-39.
Order from LC mi$2.40, ph$3.30 PB 153 544

What is meant by hypothermia? What is the reason behind the increased scientific interest in this condition? How can hypothermia benefit us? These are some of the questions which this paper attempts to answer.

Arctic Aeromedical Lab., Ladd AFB, Alaska.
THYROID ACTIVITY IN MEN EXPOSED TO COLD, by Kaare Rodahl and Gisle Bang. Oct 57, 86p. 18 refs. Technical rept. 57-36.
Order from LC mi$4.80, ph$13.80 PB 153 372

An assessment has been made of the role of the thyroid in man during the cold exposure usually encountered during normal arctic living or operations and during simulated emergency survival in the cold. The study included careful clinical examination, estimates of dietary iodine intakes, environmental exposure, and analyses of PBI and serum cholesterol. There appears to be no real difference in thyroid uptake or urinary elimination of I^{131}, in the PBI^{131}, or in the conversion ratio; and that there was no consistent seasonal difference in the PBI or any significant difference between the natives and the Whites. There was no real evidence of any greater thyroid stimulation in infantrymen engaged in extensive outdoor activities than in airmen engaged in indoor activities during the winter; nor was there any evidence of increased thyroid stimulation in the Whites at the end of a 4-week severe cold exposure. The thyroid does not play any significant role in human acclimatization to the arctic environment when the cold stress is no greater than what is normally encountered by soldiers engaged in usual arctic service or by Alaskan Eskimos or Indians in the course of their normal life or activities. (Author)

Armed Forces-NRC Committee on Hearing and Bio-Acoustics [Washington, D. C.]
THE EVALUATION OF AUDIOMETERS, ed. by Robert W. Benson. Rept. on Contract Nonr-2300(05). Mar 60, 54p. AD-234 693.
Order from LC mi$3.60, ph$9.30 PB 153 778

Contents:
Definitions and background information
Classes and types of audiometers
American standard specification for audiometers
Importance of accurate frequency calibration for monitoring audiometry
Monitoring the accuracy of calibration of audiometers
The listing of audiometers by the AAOO
Pure tone audiometry is basic
Accessory equipment for special tests
Results of the working group review of available audiometers
Shortcomings of audiometers
Characteristics of commercially available audiometers
Index to individual audiometers
Index to group audiometers

Army Ordnance Human Engineering Labs., Aberdeen Proving Ground, Md.
THE EFFECTS OF EIGHT HOURS CONFINEMENT IN MOBILE ARMORED PERSONNEL CARRIERS ON SELECTED COMBAT RELEVANT SKILLS: STUDY II, by Samuel A. Hicks, Jimmy P. Scott, and Claude D. Patton. Nov 60, 27p. 4 refs. Technical memo. 17-60.
Order from LC mi$2.70, ph$4.80 PB 153 469

Forty enlisted men were tested both before and after confinement on tests designed to measure stamina, eye-arm coordination, gross motor coordination, arm steadiness, and rifle accuracy. The eight-hour confinement period resulted in losses in three areas. The losses were statistically significant in two areas. Recommendations are included for future research. (Author) (See also PB 147 162)

Biomedical Lab., Wright Air Development Div., Wright-Patterson AFB, Ohio.
GROSS AND MICROCIRCULATORY EFFECTS OF TILTING AND ACCELERATION ON THE GOLDEN HAMSTER, by Paul L. Yudkofsky. Rept. on Biophysics of Flight. Sep 60, 81p. 110 refs. WADD Technical rept. 60-373.
Order from OTS $2.25 PB 171 367

The heart rate, respiratory rate, blood pressure, electrocardiogram, organ displacements, and microcirculation of the golden hamster were recorded and correlated during a wide range of gravitational stress, i.e., from 1 to 60 positive g. The effects of various anesthetics and hemorrhage on the observed responses were determined. Lastly, the cardiovascular responses of the hamster to occlusion of the carotid arteries were interpreting and necropsy examinations were performed to aid in interpreting the recorded physiologic data. Tilting from the horizontal to head-up position elicited no pronounced physiologic responses in the test animal. The increased forces encountered during centrifugation elicit pronounced effects which appear to be primarily compensated for by increased heart rate. The microcirculation of the hamster cheek pouch did not appear to actively enter into the reactions to positive acceleration. Also, the cause of death at various magnitudes of acceleration is discussed. (Author)

California U., Berkeley.
SURVIVAL OF C-57 MICE AND SQUIRREL MONKEYS IN HIGH AND LOW PRESSURES OF OXYGEN, by S. F. Cook and H. F. Leon. Rept. on Contract AF 29(600)2017. Oct 60, 38p. 21 refs. AFMDC-TR-60-21.
Order from LC mi$3.00, ph$6.30 PB 153 409

The critical oxygen tension for C-57 mice lies between 624 and 528 mm Hg O_2; for squirrel monkeys between 600 and 548 mm Hg O_2. However, at 624 mm Hg O_2 monkeys appear more resistant than C-57 mice. With low oxygen pressures the mice are slightly more resistant. The lethal limit for monkeys is near 94 mm Hg O_2 whereas mice can tolerate moderately well pressures of oxygen as low as 84 mm Hg. Two different toxic effects of high oxygen pressures are distinguished: (1) acute, referable to lung damage, and (2) chronic, referable perhaps to disturbance of cell enzyme systems. (Author)

Michael Reese Hospital, Chicago, Ill.
THE REGULATION OF THE DISTRIBUTION OF THE CARDIAC OUTPUT. I. BLOOD PRESSURE AND BLOOD FLOW REGULATING MECHANISMS ELICITED BY INTRACRANIAL COMPRESSION. II. STUDIES ON CLINICAL MEASURES OF BLOOD FLOW TO THE EXTREMITIES, by Simon Rodbard and Louis N. Katz. Mar 58, 38p. 14 refs. AAL Technical rept. 57-8.
Order from LC mi$3.00, ph$6.30 PB 153 365

Certain aspects of blood pressure and blood flow regulation were studied in animal experiments, utilizing the stimulus of intracranial compression. These experiments elucidate mechanisms which act in concert to provide a quantitative blood pressure response to a neurogenically determined pressure regulating stimulus. They provide the basis for a hypothesis that a pressure sensitive receptor is present inside the cranial cavity. The need for a simple indirect method for the estimation of the blood flow through extremities is apparent in the limitations of present methods. Two of the cardiovascular phenomena of the extremities, the oscillometric pulsations and the arterial sounds, were studied to determine if these might be used to estimate the peripheral vascular efficiency. Arterial sounds can be used to appraise extremity blood flow. The sounds heard during routine blood pressure estimation are diminished when blood flow is minimal, as occurs in the extremities of the aged or after the application of a tourniquet. Increased blood flow leads to the production of loud sounds. The clinical value of attention to the intensities of these sounds is demonstrated.

North Dakota U. [Grand Forks].
EFFECT OF COLD ON RENAL FUNCTION, by William C. Nungesser. Rept. on Contract AF 18(600)1136. Dec 56, 17p. 4 refs. Technical note AAL-TN-56-37.
Order from LC mi$2.40, ph$3.30 PB 153 542

School of Aviation Medicine, Brooks AFB, Tex.
FLOW RATE RESPONSES OF THE HUMAN PAROTID GLAND, by Ira L. Shannon and John R. Prigmore. Sep 60, 14p. 39 refs. Rept. 60-85.
Order from LC mi$2.40, ph$3.30 PB 153 302

The present series of experiments was designed to determine the parotid gland flow rate response to certain stimulating agents, and to other methods of exogenous elicitation. (Author)

School of Aviation Medicine, Brooks AFB, Tex.
SECONDARY OCULAR NYSTAGMUS AS A FUNCTION OF INTENSITY AND DURATION OF ACCELERATION, by George T. Hauty and G. R. Wendt (U. of Rochester). Rept. on Contract N6ori-126, T. O. 1. Apr 60, 12p. 34 refs. Rept. no. 60-29; AD-241 862.
Order from LC mi$2.40, ph$3.30 PB 147 778

Neither intensity nor duration of stimulation was found to be consistently related to the intensity and duration of secondary nystagmus. Yet, total secondary nystagmic output was directly related to the product of intensity and duration of stimulation and, moreover, was roughly one-half that of the total output of the preceding primary phase of nystagmus. These results, interpreted in the light of existing knowledge, suggest that the response characteristics of secondary nystagmus are determined by activity occurring in the vestibular nuclei complex. (Author)

University of Southern California. School of Medicine, Los Angeles.
EFFECT OF CHANGES IN ENVIRONMENTAL TEMPERATURE ON STOMACH EMPTYING IN RATS, by E. Geiger and J. J. Pinsky. Rept. on Contract AF 18(600)549. [1956] 11p. 8 refs. Technical note AAL-TN-56-5.
Order from LC mi$2.40, ph$3.30 PB 153 511

Transfer of rats from room (22° C.) to either low (3° C.) or high (37° C.) environmental temperature immediately following a protein meal delays emptying of the stomach. After adaptation to the changed surrounding temperature, the stomach emptying was found to be, again, similar to that observed at room temperature. (Author)

Washington U., Seattle. School of Medicine.
SMALL SAMPLE VOLUME INFRA-RED CARBON DIOXIDE ANALYZER, by Allan C. Young and W. A. Robinson. Rept. on Contract AF 33(038)422. Dec 54, 10p. 4 refs. AAL Proj. no. 7-7951, rept. no. 1.
Order from LC mi$1.80, ph$1.80 PB 153 335

A compact CO_2 analyzer using an interrupted infrared beam is described. The sample chamber has a volume of 1 cc. Ninety per cent response requires a time of 1/25 sec and a volume flow of 1 cc. (Author)

Wisconsin U., Madison.
BLOOD GROUPS OF THE ANAQTUAVIK ESKIMOS, ALASKA, by W. S. Laughlin. June 57, 20p. 17 refs. AAL Technical rept. 57-5.
Order from LC mi$2.40, ph$3.30 PB 153 347

The presence of blood type B has been established in the interior Eskimos of Alaska. The closest Eskimos for whom data exists, Point Barrow, Nome, Bethel, and Mackenzie River, all have varying frequencies of

B. The Indians of Alaska and the Mackenzie River either lack B, or have an extremely small amount, most likely attributable to admixture with Whites or Eskimos. The Anaqtuavik sample contains many related people; only six persons are not known to be related to each other. The extent of relationship has not been provided for other groups with whom they may be compared. The Anaqtuavik Eskimos fit within the framework of the western Eskimos who have a relatively continuous distribution and high population density in comparison with the central Eskimos. That they retain blood group B and a high proportion of A is contributing evidence to the fact that they have maintained direct and indirect contacts with other western Eskimos. (Author)

Biochemistry

Henry Ford Hospital, Detroit, Mich.
[STUDIES ON SUCCINIC DEHYDROGENASE] by Edna B. Kearney and Thomas P. Singer. Annual progress rept. on Contract Nonr-1656(00). 10 Feb 60, 12p. 45 refs. AD-232 663.
Order from LC mi$2.40, ph$3.30 PB 153 164

Contents:
Prosthetic group of mammalian succinic dehydrogenase
Purification and constitution of choline dehydrogenase
Functional interrelations of the respiratory chain in liver mitochondria
Permeability factors in the assay of respiratory enzymes
Recent studies on succinic dehydrogenase
On the multiplicity of lactic dehydrogenases in yeast

Indiana U. School of Medicine, Indianapolis.
A SIMPLE BEAM-SPLITTER FOR THE ZEISS FUNDUS CAMERA, by John B. Hickam. Sep 60, 4p. AFSAM 60-87.
Order from LC mi$1.80, ph$1.80 PB 153 303

In the photographic method now being used to estimate percent oxygen saturation of retinal venous blood, the density of the photographic image of a retinal vein is measured successively by red and by infrared light, using first one filter and then the other. Greater convenience and accuracy may be obtained by exposure through red and infrared filters simultaneously; a simple beam-splitter has been devised for this purpose. (Author)

Pittsburgh U. [Pa.]
A STUDY OF THE MECHANISM OF PHOTOSENSITIZATION IN PHOTOSYNTHESIS, by Jerome L. Rosenberg. Annual progress rept. for 1 Jan-31 Dec 59 on Contract Nonr-624(08). 1 Feb 60, 10p. 14 refs. AD-232 419.
Order from LC mi$1.80, ph$1.80 PB 153 127

The fluorescence spectrum of chlorophyll in green plants was observed. A monochromator, incorporated into a fluorescence apparatus, was tested by using it to study interesting changes in the fluorescence of alcoholic solutions of chlorophyll at low temperatures and high concentrations. (Author)

Tufts [U. School of Medicine] Boston, Mass.
CONTINUING STUDIES ON THE METABOLISM OF FATTY ACIDS AND RELATED SUBSTANCES IN ANIMALS EXPOSED TO COLD, by David Rapport. Rept. on Contract AF 18(600)583. Dec 56, 7p. Technical note AAL-TN-56-20.
Order from LC mi$1.80, ph$1.80 PB 153 526

Partial contents: Hepatic acetate metabolism.

Tufts [U. School of Medicine] Boston, Mass.
CONTINUING STUDIES ON THE METABOLISM OF FATTY ACIDS AND RELATED SUBSTANCES IN ANIMALS EXPOSED TO COLD, by David Rapport. Rept. on Contract AF 18(600)583. Dec 56, 4p. Technical note AAL-TN-56-21.
Order from LC mi$1.80, ph$1.80 PB 153 527

Partial contents: Hepatic acetate metabolism. Effect of glucose on hepatic acetate metabolism.

Tufts [U. School of Medicine] Boston, Mass.
CONTINUING STUDIES ON THE METABOLISM OF FATTY ACIDS AND RELATED SUBSTANCES IN ANIMALS EXPOSED TO COLD, by David Rapport. Rept. on Contract AF 18(600)583. Dec 56, 6p. Technical note AAL-TN-56-22.
Order from LC mi$1.80, ph$1.80 PB 153 528

Partial contents: Lipogenesis and cholesterogenesis in a liver homogenate system. Effect of pyruvate on hepatic acetate metabolism.

Tufts [U. School of Medicine] Boston, Mass.
CONTINUING STUDIES ON THE METABOLISM OF FATTY ACIDS AND RELATED SUBSTANCES IN ANIMALS EXPOSED TO COLD, by David Rapport. Rept. on Contract AF 18(600)583. Dec 56, 10p. Technical note AAL-TN-56-23.
Order from LC mi$1.80, ph$1.80 PB 153 529

Partial contents: Lipogenesis and cholesterogenesis in a liver homogenate system. Effect of pyruvate on hepatic acetate metabolism. Effect of ketoglutarate on acetate metabolism.

Tufts [U. School of Medicine] Boston, Mass.
CONTINUING STUDIES ON THE METABOLISM OF FATTY ACIDS AND RELATED SUBSTANCES IN ANIMALS EXPOSED TO COLD, by David Rapport. Rept. on Contract AF 18(600)583. Dec 56, 8p. Technical note AAL-TN-56-24.
Order from LC mi$1.80, ph$1.80 PB 153 530

Partial contents: Effect of unlabeled acetate on hepatic acetate-1-c^{14} metabolism. Effects of ketoglutarate on acetate metabolism. Effect of NaCl on hepatic acetate metabolism. Effects of glucose and pyruvate on acetate metabolism. Effect of butyrate on acetate metabolism. Lipogenesis in liver homogenate system.

Tufts [U. School of Medicine] Boston, Mass.
CONTINUING STUDIES ON THE METABOLISM OF FATTY ACIDS AND RELATED SUBSTANCES IN ANIMALS EXPOSED TO COLD, by David Rapport. Rept. on Contract AF 18(600)583. Dec 56, 11p. Technical note AAL-TN-56-25.
Order from LC mi$2.40, ph$3.30 PB 153 531

Partial contents: Effect of pyruvate on hepatic acetate metabolism. Effect of butyrate on acetate metabolism. Effect of butyrate on glucose metabolism. Experiments with liver homogenates.

Tufts [U. School of Medicine] Boston, Mass.
CONTINUING STUDIES ON THE METABOLISM OF FATTY ACIDS AND RELATED SUBSTANCES IN ANIMALS EXPOSED TO COLD, by David Rapport. Rept. on Contract AF 18(600)583. Dec 56, 12p. Technical note AAL-TN-56-26.
Order from LC mi$2.40, ph$3.30 PB 153 532

Partial contents: Effect of short chain fatty acids on hepatic acetate metabolism. Effect of Krebs cycle intermediates on hepatic acetate metabolism.

Tufts [U. School of Medicine] Boston, Mass.
CONTINUING STUDIES ON THE METABOLISM OF FATTY ACIDS AND RELATED SUBSTANCES IN ANIMALS EXPOSED TO COLD, by David Rapport. Rept. on Contract AF 18(600)583. Dec 56, 12p. Technical note AAL-TN-56-27.
Order from LC mi$2.40, ph$3.30 PB 153 533

Partial contents: Effects of Krebs cycle intermediates on hepatic acetate metabolism. Effects of short chain fatty acids on hepatic acetate metabolism. Studies on the whole rat exposed to cold.

Tufts [U. School of Medicine] Boston, Mass.
CONTINUING STUDIES ON THE METABOLISM OF FATTY ACIDS AND RELATED SUBSTANCES IN ANIMALS EXPOSED TO COLD, by David Rapport. Rept. on Contract AF 18(600)583. Dec 56, 11p. Technical note AAL-TN-56-28.
Order from LC mi$2.40, ph$3.30 PB 153 534

Partial contents: Effect of short chain fatty acids on hepatic acetate metabolism. Comparison of the hepatic metabolism of butyrate and acetate. Acetate metabolism in liver slices from rats exposed to chronic cold.

Tufts [U. School of Medicine] Boston, Mass.
CONTINUING STUDIES ON THE METABOLISM OF FATTY ACIDS AND RELATED SUBSTANCES IN ANIMALS EXPOSED TO COLD, by David Rapport. Rept. on Contract AF 18(600)583. Dec 56, 11p. Technical note AAL-TN-56-29.
Order from LC mi$2.40, ph$3.30 PB 153 535

Partial contents: Inhibition of hepatic metabolism by short chain fatty acids. Effect of butyrate and acetate on propionate and glucose metabolism. Effect of propionate and butyrate on succinate oxidation. Metabolism in liver prepared from cold-fasted rats. Studies on the whole rat exposed to cold.

Tufts [U. School of Medicine] Boston, Mass.
CONTINUING STUDIES ON THE METABOLISM OF FATTY ACIDS AND RELATED SUBSTANCES IN ANIMALS EXPOSED TO COLD, by David Rapport. Rept. on Contract AF 18(600)583. Dec 56, 9p. Technical note AAL-TN-56-30.
Order from LC mi$1.80, ph$1.80 PB 153 536

Partial contents: Metabolism in liver slices prepared from chronic cold-fasted rats. Metabolism in liver from cold-fasted rats. Lipogenesis in the whole rat. Cold exposure and diabetes.

Tufts [U. School of Medicine] Boston, Mass.
CONTINUING STUDIES ON THE METABOLISM OF FATTY ACIDS AND RELATED SUBSTANCES IN ANIMALS EXPOSED TO COLD, by David Rapport. Rept. on Contract AF 18(600)583. Dec 56, 18p. Technical note AAL-TN-56-31.
Order from LC mi$2.40, ph$3.30 PB 153 537

Partial contents: Fatty acid metabolism in liver slices prepared from chronic cold-fasted rats. Carbohydrate metabolism in liver from cold-fasted rats. Effect of propionate on palmitate oxidation. Inhibition of hepatic glucose metabolism by short chain fatty acids. Comparison of metabolic patterns of propionate and succinate. Cold exposure and diabetes. Fasting and blood sugar.

Tufts [U. School of Medicine] Boston, Mass.
EFFECT OF COLD EXPOSURE AND FASTING ON HEPATIC ACETATE METABOLISM, by E. J. Masoro, Arthur I. Cohen, and Sylvia S. Panagos. Rept. on Contract AF 18(600)583. Dec 56, 12p. 13 refs. Technical note AAL-TN-56-32.
Order from LC mi$2.40, ph$3.30 PB 153 538

A detailed study of the relationship between hepatic carbohydrate content and acetate oxidation was undertaken. In the present investigation the carbohydrate content of the liver was drastically reduced by fasting rats both at 25°C. and 0°C. It was found that acetate oxidation is greatly depressed by the lowering of the hepatic carbohydrate level.

Tufts [U. School of Medicine] Boston, Mass.
EFFECT OF EXPOSURE TO COLD ON SOME ASPECTS OF HEPATIC ACETATE UTILIZATION, by E. J. Masoro, Arthur I. Cohen, and Sylvia S. Panagos. Rept. on Contract AF 41(657)145. Dec 56, 18p. 22 refs. Technical note AAL-TN-56-33.
Order from LC mi$2.40, ph$3.30 PB 153 539

Respiration studies on surviving tissue slices have indicated that liver, heart, kidney, and skeletal muscle are involved in the increased metabolic rate associated with exposure of animals to cold environmental temperatures. Therefore, a study of the metabolism of a labeled compound by surviving tissues should present a more complete picture of changes in intermediary metabolism occurring under this condition. Using C^{14}-labeled acetate, the pattern of hepatic acetate metabolism in the cold-exposed animal was investigated.

Tufts [U.] School of Medicine, Boston, Mass.
THE EFFECT OF PROLONGED COLD EXPOSURE ON HEPATIC LIPOGENESIS, by E. J. Masoro, J. M. Felts, and Sylvia S. Panagos. Rept. on Contract AF 18(600)583. Dec 56, 10p. 12 refs. Technical note AAL-TN-56-36.
Order from LC mi$1.80, ph$1.80 PB 153 541

The present report extends studies of hepatic lipogenesis to rats that have lived in the cold successfully for several months - " cold-adapted" rats. Liver slices from these "cold-adapted" rats also showed depressed lipogenesis, but the surprising finding is that this reduction in fatty acid synthesis is not the result of a curtailed hepatic carbohydrate metabolism.

Tufts U. School of Medicine, Boston, Mass.
EFFECTS OF SHORT CHAIN FATTY ACIDS ON HEPATIC ACETATE METABOLISM IN COLD EXPOSURE AND FASTING, by E. J. Masoro and Sylvia S Panagos. Mar 58, 9p. 12 refs. AAL Technical rept. 57-6.
Order from LC mi$1.80, ph$1.80 PB 153 363

Butyrate, isobutyrate, propionate, caproate, and acetoacetate failed to reverse the block in acetate-1-C^{14} oxidation found in liver slices from rats fasted at 0 to 2° C. for 24 hours. It appears that the ability of glucose and pyruvate to increase the acetate oxidation activity of these liver slices is related to a specific step in carbohydrate metabolism rather than solely to the fact that carbohydrates are excellent sources of energy. (Author)

Tufts U. School of Medicine, Boston, Mass.
THE REGULATION OF HEPATIC ACETYL METABOLISM BY SHORT CHAIN FATTY ACIDS, by E. J. Masoro, J. M. Felts and others. May 58, 22p. 22 refs. AAL Technical rept. 57-7.
Order from LC mi$2.70, ph$4.80 PB 153 364

Propionate, isobutyrate, and caproate inhibited all phases of acetate-1-C^{14} metabolism. Although butyrate suppressed acetate oxidation, the evidence indicates that butyrate increases lipogenesis from acetate. It is apparent that fatty acids can exert a regulatory action on acetyl metabolism. (Author)

Tufts U. School of Medicine, Boston, Mass.
THE ROLE OF CARBOHYDRATE METABOLISM IN PROMOTING FATTY ACID OXIDATION, by E. J. Masoro and J. M. Felts. Rept. on Contract AF 41(657)145. Nov 57, 18p. 18 refs. Technical note AAL-TN-57-36.
Order from LC mi$2.40, ph$3.30 PB 153 548

In the experiments reported in the present communication, the effect of carbohydrates on the oxidation by liver slices of various fatty acids has been studied. The resulting evidence indicates that, while carbohydrate metabolism appears to be necessary for an optimal rate of fatty acid oxidation, it apparently is not a function of the "sparking" action of oxalacetate or other Krebs cycle intermediates.

Tufts [U.] School of Medicine, Boston, Mass.
STUDIES ON THE METABOLISM OF FATTY ACIDS AND RELATED SUBSTANCES IN ANIMALS EXPOSED TO COLD, by David Rapport. Rept. on Contract AF 18(600)583. Dec 56, 12p. Technical note AAL-TN-56-19.
Order from LC mi$2.40, ph$3.30 PB 153 525

Partial contents: Phosphate vs. bicarbonate buffer. Hepatic acetate metabolism by rats exposed to cold.

Washington U., Seattle.
METABOLIC ALTERATIONS IN RATS WITH ADAPTATION TO LOW ENVIRONMENTAL TEMPERATURES, by Walter H. Cottle. Rept. on Contract AF 18(600)1467. Nov 58, 99p. 162 refs. AAL Technical rept. 57-12.
Order from LC mi$5.40, ph$15.30 PB 153 366

The metabolic changes resulting from prolonged exposure to low environmental temperatures have been studied in male albino rats. Following the initial exposure to cold (5° C.), animals showed a gradual increase in heat loss, oxygen consumption, and food intake for 2 to 3 weeks. Metabolism at 28° C. ($MR^{28°}$) was increased 20% after 2 weeks at 5° C. After 2 weeks at 5° C., $MR^{28°}$ of thyroid-deficient rats (thyroid-ectomized and given 2.5 microgm. thyroxine per day) was also increased. Determinations were made of the metabolic rate of muscle, liver, and kidney in vitro. Metabolic rates of rats paralyzed with curare were measured at 30° C. The differences between metabolic rates of cold-adapted and nonadapted rats measured under these conditions resembled those observed when metabolic rates of intact rats were measured at 28°C. The ability of curarized rats to maintain body temperature when exposed to cold was tested. Cold-adapted rats were able to increase heat production without an increase in muscular activity (chemical regulation), and maintained rectal temperature at or near its initial level. The increase in chemical regulation with cold adaptation accounts for the reduction in muscular activity which has been found in rats in the cold after adaptation. It would also account for the ability of the cold-adapted animals to increase heat production to the high levels necessary to withstand severe cold stress. (Author)

General Biology

Arctic Aeromedical Lab., Ladd AFB, Alaska.
HELMINTH PARASITES OF ALASKAN MUSKRATS, by Tommy T. Dunagan. Dec 56, 8p. 17 refs. Technical note AAL-TN-56-16.
Order from LC mi$1.80, ph$1.80 PB 153 522

Since it is known that there may be considerable variation in the parasites of muskrats from one locality to another, the present study brings this variation and its interrelation with environment into better light by the obvious absence of certain particular species.

Arctic Aeromedical Lab., Ladd AFB, Alaska.
STUDIES ON THE PARASITES OF EDIBLE ANIMALS IN ALASKA, by Tommy T. Dunagan. [1956] 10p. Technical note AAL-TN-56-12.
Order from LC mi$1.80, ph$1.80 PB 153 518

This report is a systematic listing of species examined and parasites found. No effort has been made to enlarge or explain any of the resulting conditions caused by the parasite. No discussion of systematic parasitology occurs. No ecological relations between host and parasite have been outlined. A chart showing distribution of muskrat parasites has, however, been included to emphasize that such conditions exist.

Microbiology

Arctic Aeromedical Lab., Ladd AFB, Alaska.
HYDATID DISEASE IN ALASKA, by Thomas R. A. Davis. [1956] 23p. 41 refs. Technical note AAL-TN-56-1.
Order from LC mi$2.70, ph$4.80 PB 153 507

The research effort on echinococcosis in Alaska is reviewed. The results of this strongly indicate that the disease is wide-spread both on the Alaskan Mainland and the Bering Sea Islands. Two etiologic agents have been demonstrated and these have widely separated epizootiologic and epidemiologic characteristics. On the basis of the data presented it is concluded that much field and laboratory investigations are still necessary before a proper understanding of the significance of the disease and its control can be achieved. (Author)

Arctic Aeromedical Lab., Ladd AFB, Alaska.
AN OUTBREAK OF INFECTIOUS HEPATITIS IN TWO ARCTIC VILLAGES, by Thomas R. A. Davis. Dec 56, 15p. 15 refs. Technical note AAL-TN-56-38.
Order from LC mi$2.40, ph$3.30 PB 153 543

The characteristics of an outbreak of infectious hepatitis in the Arctic is described. The relationships between the geographic distribution of cases, the human contamination of the sources of water supply, and the explosive nature of the epidemic, are propounded as reasons for the conclusion that this particular outbreak was the result of a fecal-oral mode of transmission with water acting as the causative agent vehicle. (Author)

Pathology

Arctic Aeromedical Lab., Ladd AFB, Alaska.
ENDEMIC GOITER IN ALASKA, by Kaare Rodahl and Gisle Bang. [1956] 9p. Technical not AAL-TN-56-9.
Order from LC mi$1.80, ph$1.80 PB 153 515

Inland Eskimos at Anaktuvuk Pass and the mountain Indians at Arctic Village, Alaska, had abnormally high and rapid I^{131} uptakes, as high as 85 per cent 24 hours following the tracer dose. They had low urinary eliminations, low salivary I^{131} concentrations and low plasma and protein bound I^{131} levels after 24 hours. This was associated with a high incidence of thyroid enlargements and apparently low dietary iodine intakes. These findings are typical of endemic goiter as described by Stanbury and collaborators (Harvard University Press, 1954) in the Mendoza population. (Author)

Arctic Aeromedical Lab., Ladd AFB, Alaska.
THE ISOLATION OF ENTERIC PATHOGENS AT BARROW, ALASKA, by T. R. A. Davis, J. W. Cullison and others. [1956] 7p. 8 refs. Technical note AAL-TN-56-7.
Order from LC mi$1.80, ph$1.80 PB 153 513

Investigation of the population of Barrow for Salmonellosis shows a relatively high incidence in all age-groups. A seasonal variation is demonstrated with about a 100 percent increase of isolations in the summer as compared to winter isolations. The implications of these findings are discussed. (Author)

Brooke Army Medical Center, Fort Sam Houston, Tex.
ACUTE RENAL FAILURE: THE REDUCTION OF MORBIDITY AND MORTALITY, by Paul E. Teschan, Thomas F. O'Brien, and Charles R. Baxter. Interim rept. on Traumatic Surgery and Shock. Dec 59, 11p. 7 refs. Research rept. MEDEW-RS-5-59.
Order from LC mi$2.40, ph$3.30 PB 153 193

Prophylactic daily hemodialysis is technically feasible. Morbidity in patients so treated is strikingly reduced in contrast to past experience. The recurrent clinical crises which were so common with conventional management in the past are virtually absent. It is anticipated that the clinical improvement during oliguria which characterized the patients reported herein will continue to occur in further patients treated with prophylactic dialysis at a renal center. It is further anticipated that as morbidity is lessened, a commensurate reduction in general mortality of patients with acute renal failure may also occur. (Author)

Brooke Army Medical Center, Fort Sam Houston, Tex.
IN VITRO SENSITIVITY OF PSEUDOMONADS FROM BURNED PATIENTS TO COLISTIN SULFATE, by Charles D. Graber, Wilfred T. Tumbusch, and Edward H. Vogel, Jr. Final rept. on Radiation and Thermal Burns. Nov 59, 8p. 1 ref. Research rept. MEDEW-RS-4-59; AD-246 505.
Order from LC mi$1.80, ph$1.80 PB 153 192

Bactericidal activity of colistin sulfate for Pseudomonas aeruginosa was acquired in routine tube sensitivity testing at levels considerably lower than with polymyxin B, kanamycin and neomycin. Emergence of pseudomonad resistance to this drug was not marked; only 3 out of 25 strains required more than a threefold titer increase in antibiotic needed for cidal inhibition following six serial transfers in sublethal concentration of colistin. (Author)

Brooke Army Medical Center, Fort Sam Houston, Tex.
SEPTICEMIA IN BURN INJURY, by Wilfred Tumbusch, Edward H. Vogel, Jr. and others. Interim rept. on Radiation and Thermal Burns. Oct 60, 16p. 14 refs. Research rept. MEDEW-RS-6-60; AD-246 507.
Order from LC mi$2.40, ph$3.30 PB 153 194

Data have been presented which reveal that septicemia is present at death in over 60 per cent of fatal burns. These data also suggest an increase in the clinical importance of septicemia due to Pseudomonas aeruginosa in severely burned patients. While survival from staphylococcal and a number of other types of septicemia has been attained, Pseudomonas septicemia invariably has been fatal. Attention has been focused on the similarity of the clinical course in patients with gram-negative organism septicemia to endotoxemia. Experiences with local and generalized Shwartzman-like phenomena in severely burned patients have been described. (Author)

National Library of Medicine, Washington, D. C.
LEPTOSPIROSIS. A BIBLIOGRAPHY OF LITERATURE 1957 - 1959, by Dorothy Bocker. Bibliography no. 4 on Communicable Diseases of World-wide Significance. Nov 59, 42p. 319 refs.
Order from LC mi$3.30, ph$7.80 PB 150 062

The references selected are in English, French, German, Italian, and Spanish; the period covered is 1957 - October 1959. Earlier references are given in some of the articles listed and are so indicated.

Radiobiology

Gustaf Werner Inst. for Nuclear Chemistry (Sweden).
RESEARCH ON "LOCALIZED RADIO-LESIONS". PART VI. RESTRICTED RADIO-LESIONS IN THE DEPTH OF THE BRAIN PRODUCED BY A BEAM OF HIGH ENERGY PROTONS, by Lars Leksell, Börje Larsson and others. Technical note no. 1 on Contract AF 61(052)183. 1 June 60, 21p. 9 refs. AFOSR TN-60-1406.
Order from LC mi$2.70, ph$4.80 PB 153 304

Restricted lesions were produced in the depth of the goat's brain by means of cross-fire irradiation with a narrow beam of high energy protons. The radiosurgical technique and the histopathology of the lesions are described. It was possible to produce well circumscribed cerebral lesions of a type well suited for physiological experimentation without damaging surrounding nervous tissue. The method may also be applied to neurosurgery in man. (Author) (See also PB 146 312)

Public Health Service, Washington, D. C.
RADIOLOGICAL HEALTH DATA. VOLUME 2, NO. 1. Quarterly rept. Jan 61, 63p. 7 refs.
Order from OTS $1.00 $9.00/yr. PB 161 371-10

Contents:
Section I. --Air
Public Health Service Radiation Surveillance Network
Public Health Service National Air Sampling Network
Naval Research Laboratory Radioactivity Measurements
Canadian Radioactive Fallout Study Program
Section II. --Food, other than Milk
Survey of Radioactivity in Food
Strontium-90 Concentration in Food Samples Taken in State of Alaska
Strontium-90 in Food
Strontium-90 Content in the Military Diet in Peru and Ecuador (1959)
Strontium-90 Content in the Military Diet in Vietnam (1959)
Strontium-90 Content in Diet in Various Countries
Section III. --Milk
Public Health Service Milk Monitoring Program
Strontium-90 in North American Milk
Cesium-137 in People and Milk in the United States
Section IV. --Water
Public Health Service National Water Quality Network
Monitoring of Water Supplies Around the Nevada Test Site
Section V. --Other Data
External Gamma Activity (August 1960)
Argonne National Laboratory Soil Data
Strontium-90 Concentration in Human Bone From Alaska
Strontium-90 Activity in Human Bone
Envirnmental Levels of Radioactivity at Atomic Energy Commission Installations
Fallout Studies Interpretive Reports
(See also PB 161 371-9)

Radiobiological Lab., U. of Texas, Austin.
EFFECTS OF CHRONIC LOW DOSE NEUTRON IRRADIATION UPON PERIPHERAL BLOOD ELEMENTS IN THE MONKEY (MACACA MULATTA) by George S. Melville, Jr., Robert J. Young and others. Aug 60, 13p. 15 refs. AFSAM 60-60.
Order from LC mi$2.40, ph$3.30 PB 153 301

Twenty-four monkeys (Macaca mulatta) were divided into four groups of 6 and exposed periodically to low doses of neutrons from Po-Be sources. The irradiated groups received 13, 28, and 55 rep total dose which was divided into doses administered every 4 days for 40 exposures. The cellular elements of the peripheral blood, hemoglobin, and hematocrit values were sampled and enumerated at intervals postirradiation. These data were analyzed by analysis of variance. All surviving monkeys have reestablished normal hematologic values by the end of 24 weeks postirradiation. There is no indication of any incapacitating injury under these experimental conditions. A significant statistical result was found for reticulocytes, hematocrit values, neutrophils, and lymphocytes. Only the hematocrit value changes are considered interpretable in terms of the irradiation treatment. (Author)

CHEMISTRY

Analytical Chemistry

Bell and Howell Research Center, Pasadena, Calif.
ELECTROANALYTICAL METHOD FOR THE DETERMINATION OF CARBON AND HYDROGEN IN ORGANIC COMPOUNDS, by Herbert S. Haber and Kenneth W. Gardiner. Rept. for 15 June 59-14 May 60 on The Chemistry and Physics of Materials, Contract AF 33(616)6676. Sep 60, 26p. 2 refs. WADD Technical rept. 60-415.
Order from OTS $0.75 PB 171 409

The development and application of a rapid C-H analyzer is summarized. A prototype instrument was developed combining electroanalytical and gas chromatographic techniques. Ten minutes are required for a complete analysis. Additional refinement of the apparatus will be necessary to attain the specified accuracy of 0.3% by weight. (Author)

Bureau of Naval Weapons, Washington, D. C.
MASS IN AIR 200 GRAMS TO 30 KILOGRAMS CLASSES S-1 METRIC, P, AND Q. BuWeps-BuShips Calibration Program. 18 May 60, 28p. Secondary Standards Lab. Measurement System Operation Procedure NM-02.
Order from OTS $0.75 PB 171 236

This procedure describes the operation of a secondary standards laboratory calibration system which is used to calibrate mass in air. The system consists of the Christian Becker BB-4 30 kg Large-Capacity Balance and several sets of Class S weights totaling 30 kilograms to be used as standards. Also included in the system are Tare Weights totaling 30 kilograms. The technique employed to make mass measurements is the Substitution Weighing method.

Mine Safety Appliances Co., Callery, Pa.
ANALYTICAL TECHNIQUES FOR ORGANIC COOLANTS, by Eugene P. Meckley. [Rept. on Contract Nobs-65426] 3 Jan 57, 37p. 31 refs.
Order from LC mi$3.00, ph$6.30 PB 154 408

This report released for sale to the public 16 Feb 61.

Organic compounds such as biphenyl, Dowtherm A, etc. are under investigation as possible reactor coolants and moderators. In connection with the engineering evaluation of such materials considerable analytical work is necessary. As an aid to the members participating in the organic coolants program these techniques were compiled. Included in the report is: Analysis of organic materials for traces of metallic impurities, pub. in Industrial and Engineering Chemistry 11:646-649, 15 Dec 39.

Organic Chemistry

Gates and Crellin Labs. of Chemistry, Calif. Inst. of Tech, Pasadena.
SMALL-RING COMPOUNDS XXIX. A REINVESTIGATION OF THE SOLVOLYSIS OF CYCLOPROPYLCARBINYL CHLORIDE IN AQUEOUS ETHANOL. ISOMERIZATION OF CYCLOPROPYLCARBINOL, by Marjorie C. Caserio, William H. Graham and John D. Roberts. Technical rept. no. 7 on Contract Nonr-220(26). Feb 60, 32p. 11 refs. Contribution no. 2554, AD-233 406.
Order from LC mi$3.00, ph$6.30 PB 153 156

Contrary to the reports of other workers, it was found that the solvolysis of cyclopropylcarbinyl chloride in 80% ethanol is attended by substantial rearrangement - not only do the solvolysis products include cyclobutyl and allylcarbinyl alcohols and ethyl ethers but cyclopropylcarbinyl chloride undergoes partial rearrangement by "internal return" to cyclobutyl and allylcarbinyl chlorides. Nuclear magnetic resonance spectroscopy has been used to demonstrate that considerable isotope-position rearrangement takes place under quite mild conditions in the reactions of deuterium-labeled cyclopropylcarbinol and cyclobutanol with thionyl chloride. Isotope-position changes have been studied in the acid-induced isomerization of cyclopropylcarbinol. (Author)

Massachusetts U., Amherst.
THE SCATTERING FROM PORTIONS OF SINGLE SPHERULITES OF POLYETHYLENE OXIDE, by Marion B. Rhodes and Richard S. Stein (Master's thesis). ONR Technical rept. no. 17 on Contract Nonr-2151(00). 29 Feb 60, 15p. 12 refs. AD-244 443.
Order from LC mi$2.40, ph$3.30 PB 150 656

Photographic light-scattering experiments were conducted on 5- to 10-mm-diam spherulites of polyethylene oxide. By moving the sperulite sample relative to the light beam, patterns were obtained on scanning a spherulite along a horizontal radius, a vertical radius, and a 45° radius for V_V, H_h, and H_V polarization. All the scattering patterns apparently have preferential elongation in a direction tangential to the spherulite. The intensity and elongation of the pattern is greatest when the direction of polarization is tangential. The pattern did not vary greatly with distance from the center of the spherulite. The scattering patterns also indicated that the local polarizability varies in the radial and tangential direction of the spherulite in a manner which is consistent with a fiber or plate like structure for the spherulite; the long direction of the fiber or plate is radial to this direction, and the great est refractive index is perpendicular. An experiment was designed to differentiate among the possible causes for fluctuation in the scattering pattern; it involved obtaining patterns for various samples which had been swollen with solvent having refractive indices different from that of the sample. The solvents used were methylphenyl ether, CCl_4, acetone, propylene glycol, cyclohexanone, nitrobenzene, and a number of silicone fluids with a refractive index in

the 1.35 to 1.55 range, as compared to about 1.46 for a sample. Orientational differences are the most probable cause of scattering; in highly ordered crystals of polyethylene which exhibit ring structure, the a and c axes are tangential and rotate helically about the b axis with increasing radius.

New Hampshire U. [Durham]
ELECTROPHILIC DISPLACEMENT REACTIONS. X. GENERAL ACID CATALYSIS IN THE PROTODEBORONATION OF ARENEBORONIC ACIDS, by Henry G. Kuivila and K. V. Nahabedian. Rept. on Contract AF 49(638)312. [1960] 24p. 22 refs. AFOSR TN-60-1270.
Order from LC mi$2.70, ph$4.80 PB 153 216

The kinetics of the protodeboronation of p-methoxybenzeneboronic acid in aqueous sulfuric, phosphoric and perchloric acids, and in formic acid have been studied. The rate constants in the first three acids are correlated by the acidity function H_O, but they are considerably greater at given values of H_O in phosphoric acid than in the other two. In formic acid containing 1.3% water and 4.0% ethylene glycol dimethyl ether the rate constants are not correlated by H_O. The presence of added sodium formate in amounts which change the acidity by a factor of ten does not change the rate constant, indicating reaction with molecular formic acid. The rate of protodeboronation of the more reactive 2,6-diemthoxybenzeneboronic acid in aqueous perchloric acid up to 2.5 M is correlated by H_O, and not by stoichiometric acid concentration. (Author)

New Hampshire U. [Durham]
ELECTROPHILIC DISPLACEMENT REACTIONS. XII. SUBSTITUENT EFFECTS IN THE PROTODEBORONATION OF ARENEBORONIC ACIDS, by K. V. Nahabedian and Henry G. Kuivila. Rept. on Contract AF 41(638)312. [1960] 36p. 21 refs. AFOSR TN-60-1346.
Order from LC mi$3.00, ph$6.30 PB 153 215

Kinetic studies on the hydrolysis of nine areneboronic acids in aqueous sulfuric and phosphoric acids are described. Dependence of rate on acidity has been examined in each case, and activation parameters and solvent hydrogen isotope effects have been determined in certain cases. Conventional H_O plots reveal the presence of two kinetically distinct regions separated by the H_O range 5.0-5.5. The behavior of activation parameters and solvent isotope effects bear out this dichotomy. Consideration of these facts coupled with the effect of substituents on reactivity leads to an interpretation of the data in terms of the existence of at least two mechanisms for the reaction. (Author) (See also PB 153 216)

Physics Lab., Wright Air Development Div., Wright-Patterson AFB, Ohio.
MOLECULAR WEIGHT DETERMINATION IN THE CHARACTERIZATION OF POLYMERS, by Richard M. Lange. Rept. for Mar 59-Jan 60 on Non-Metallic and Composite Materials. Sep 60, 28p. 7 refs. WADD Technical rept. 60-357.
Order from OTS $0.75 PB 171 401

Preliminary results are given on the determination of the macro-structure of poly-(dimethyl-2.2'-dimethylene pimelate) prepared by solution polymerization to 40% conversion. The physical methods used in this study include osmometry, light-scattering, viscometry and fractional precipitation. Osmotic pressure measurements on a sample of the whole polymer in toluene solution yielded a number-average molecular weight of 3.36×10^5 grams/mole. Light-scattering measurements on the same system gave a weight-average molecular weight of 2.80×10^6 grams/mole. The heterogeneity index (M_w/M_n) of this polymer indicates a broad distribution of molecular weights. A small sample of the polymer was subjected to fractional precipitation techniq with only partial success. Weight and number-average molecular weights were obtained on two fractions. (Author)

Purdue U., Lafayette, Ind.
THE METALATION OF DIPHENYLFERROCENYLCARBINOL, by Robert A. Benkeser, Walter P. Fitzgerald, and Marvin S. Melzer. Rept. on Contract AF 49(638)297. 10 Nov 60, 9p. 1 ref. AFOSR-TN-60-1365; AD-246 801.
Order from LC mi$1.80, ph$1.80 PB 153 265

Triphenylcarbinol can be metalated with n-butyllithium and then carbonated to form the lactone of triphenylcarbinol-2,2'-dicarboxyl acid. A somewhat analogous reaction which occurs with diphenylferrocenylcarbinol is reported.

Physical Chemistry

Air Crew Equipment Lab., Naval Air Material Center, Philadelphia, Pa.
DESIGN CRITERIA FOR EFFICIENT FILLING OF LIQUID OXYGEN CONVERTERS: DEVELOPMENT AND EVALUATION OF, by Francis A. Florio. 29 Aug 60, 19p. NAMC-ACEL-439; TED NAM AE-51143; AD-243 454.
Order from LC mi$2.40, ph$3.30 PB 153 354

A proposed method of filling liquid oxygen converters is presented and demonstrated as being feasible in principle and operation. Filling of 5, 10, and 25 liter Dewar flasks are performed under various service and design conditions. In addition, effects of filling pressure, component pre-cooling, and Dewar volume are also investigated. The total loss of liquid oxygen resulting in transfers performed by the proposed method are extremely small and represent approximately .5 to 3.5 per cent of the total amount of liquid transferred. The proposed method is offered as a possible substitute for standard Navy methods of filling liquid oxygen converters for air crew breathing. (Author)

Bonn U. (West Germany).
LABORATORY EXPERIMENTS ON FORMATION AND OXIDATION OF HYDROGEN IN THE ATMOSPHERE, by Wilhelm Groth. Final rept. for 1 Nov 58-31 July 59 on Contract AF 61(052)128. 31 Aug 59, 17p. 17 refs; AD-227 279.
Order from LC mi$2.40, ph$3.30 PB 150 690

A light source was constructed for the investigation of the photolysis of water vapor. A xenon discharge arc of a pressure of about 50 mm in a thin wall quartz tubing was used. Molecular hydrogen formed from water vapor in the presence of other gases was measured by employing tritium as a tracer. A vacuum system was constructed, allowing the separation of water vapor from hydrogen to better than 10^{-8} parts, and the counting of tritiated hydrogen in a Geiger counter. All measurements were carried out in a semi-quantitative way and it was found that the light source and the technique of measuring small amounts of free hydrogen by employing a tritium tracer can be used effectively for further studies of the reactions involving hydrogen and water. Self-decomposition of tritiated water vapor with and without addition of oxygen was measured and was found to be negligible under the particular conditions of the experiments over periods of several months. The photochemically induced exchange of tritium between tritiated water vapor and molecular hydrogen was studied. The quantum yield of this exchange was found to be under the conditions of the experiments of the order of one and probably slightly larger than one. It was possible to demonstrate the formation of free hydrogen from the photolysis of water vapor in the presence of oxygen and to measure these amounts as a function of oxygen pressure. The steady state concentrations of H_2 formed from water vapor by irradiation in the presence of oxygen under the influence of UV light were found to be smaller than expected. Photochemical oxidation of H_2 by O_2 under the particular conditions of the experiments and at pressures of about one millimeter was found to have a quantum yield of the order of magnitude of one. (Author)

Calvin Coll., Grand Rapids, Mich.
THE CATHODIC BEHAVIOR OF AgO IN ALKALINE SOLUTIONS, by Thedfors P. Dirkse. Technical rept. no. 10 on Contract Nonr-1682(01). 30 Jan 60, 19p. 8 refs. AD-233 898.
Order from LC mi$2.40, ph$3.30 PB 152 871

A study has been made of the discharge of AgO in order to determine why only a part of the discharge capacity of AgO is delivered at the potential of the AgO-Ag_2O couple, and to determine the role of oxygen in this process. The difference in discharge capacity of electrodes produced by constant current and by constant potential anodization has also been studied. A mechanism involving the transport of $O^=$ ions through the electrode material and the reaction of these ions with the electrolyte is presented. (Author)

Coating and Chemical Lab., Aberdeen Proving Ground, Md.
AMINO CARBOXYLIC AMPHOTERIC SURFACTANTS IN ALKALINE CLEANERS, by A. Mankowich. 9 Nov 60, 9p. 2 refs. CCL #98.
Order from OTS $0.50 PB 171 128

A study was made of amino-carboxylic amphoteric surfactants in soak-type alkaline cleaners suitable for use with aluminum and magnesium (nonferrous) alloys as well as with ferrous materials. Compounds were developed possessing the "improved detergency" necessary for the removal of asphalt and mineral oil soils. The surfactant portion of such compounds may consist of as little as 1.0 percent of the partial sodium salt of N-lauryl beta iminodipropionate plus 1.0 percent of a polyethanoxy nonyl phenol (15-30 ethylene oxide mole ratio). Galvanic corrosion tests using magnesium-aluminum couples indicated satisfactory behavior of the aluminum, the anodic member of the couple, as well as of the magnesium. The developed cleaners meet all the performance requirements of Fed. Spec. P-C-436a (Cleaning Compound, Alkali Type) except surface tension. (Author)

Colorado U., Boulder.
THE THERMOCHEMISTRY AND PHOTOCHEMISTRY OF ORGANIC HALOGEN COMPOUNDS, by R. Burkhart, H. B. Gottlieb and others. Final rept. on Contract AF 49(638)241. 6 Sep 60, 98p. 68 refs. AFOSR-TR-60-126; AD-245 663.
Order from OTS $2.25 PB 171 376

Kinetic Study of the Photobromination of Trifluorobromo Ethylene: A high-pressure, General Electric, Model A-H6 mercury arc lamp was used as a light source. The extensive induction period, before the maximum rate was achieved, was increased when Cl was not removed from the Br by reaction with KBr. When the incident light intensity was doubled, the induction period was cut nearly 50%. An increase in the amount of absorbed radiation by increasing the Br pressure, instead of the incident light intensity, gave only a small decrease in the induction period. The reaction order for Br was 3/2. Photochlorination of Trifluorobromoethylene: An interference filter transmitting light at 424 A was used in connection with the A-H6 lamp; the remaining experimental procedures were similar to those in the previous investigation. The kinetics of this reaction depended on the volume-to-surface ratio of the reaction cell. Five reactions were conducted to determine the dependence of the rate on light intensity; 0.56 and 0.57 when the Cl pressure was 97.9 and 68.2 mm, respectively. Flames Produced by Burning Fluorine-Containing Olefins: A study was made of the flames produced by the combustion of chlorotrifluoroethylene, Cl, and O; perfluoroisobutene, 1,1-difluoroethylene, 1,2-dichloro-1,2-defluoroethylene, and perfluorocyclobutene. A study was made of the factors which influence the intensity of the glow produced by the reaction of chlorotrifluoroethylene with O. For the chlorotrifluoroethylene reaction with Cl, the products of the diffusion flame were CF3Cl, CF3C12, CFC13, and CF2Cl-CFC12.

Cryogenic Lab., Ohio State U. Research Foundation, Columbus.
THE HEAT OF SUBLIMATION OF CARBON, by P. Goodman, M. Nay and others. Rept. on Contract W 33-038-ac-17721. 1 Apr 49, 83p. 333 refs. AMC Technical Intelligence rept. no. F-TR-2264-IA-1; ATI-114 680.
Order from LC mi$4.80, ph$13.80 PB 154 056

This report released for sale to the public 15 Feb 61.

The literature pertaining to the heat of sublimation of carbon has been reviewed, and the various methods which have been employed in an attempt to determine this quantity are discussed. The experimental methods used may be divided into two groups. The first group

of data was obtained from the dissociation phenomena of carbon monoxide, and the second group from direct measurements upon carbon. Both the experimental evidence obtained from the spectrum of CO and the different interpretations thereof are given. The investigations performed by electron impact methods as well as the photodissociation of CO are also reviewed. The second group of experiments was performed on carbon at temperatures exceeding 2500°K. The results obtained from the carbon arc, resistance and induction heating methods, and rate of vaporization and effusion methods are discussed. A consideration of the material presented in this review leads to the conclusion that, as yet, no unique value for the heat of sublimation of carbon may be given with certainty. (Author)

Frick Chemical Lab., Princeton U., N. J.
CHEMICALLY INDUCED VIBRATIONAL EXCITATION: HYDROXYL RADICAL EMISSION IN THE 1-3 MICRON REGION PRODUCED BY THE $H+O_3$ ATOMIC FLAME, by David Garvin, H. P. Broida and H. J. Kostkowski (National Bureau of Standards) Technical note no. 5 on Contracts AF 18(603)134 and CSO 680-56-30. 24 Aug 59, 24p. 18 refs. AFOSR TN-59-746; AD-226 573.
Order from LC mi$2.70, ph$4.80 PB 150 923

A detailed investigation has been performed in the 1 to 3 micron wavelength region on the radiation emitted by the hydroxyl radical from a low pressure flame of ozonized oxygen and atomized hydrogen.

Frick Chemical Lab., Princeton U., N. J.
ELASTIC CONSTANTS AND INTERMOLECULAR FORCES IN ICE, by C. Haas. Technical rept. no. [5] on Contract Nonr-1858(27). 27 Apr 60, 14p. 4 refs.
Order from LC mi$2.40, ph$3.30 PB 148 021

The five independent elastic constants of ice have been calculated in terms of two constants, the force constants for stretching and bending the hydrogen bond. The calculated elastic constants are all within 5 percent of the observed values. The same force constants also yield values for the lattice frequencies which agree reasonably well with those determined experimentally. (Author)

General Telephone and Electronics Labs., Inc., Bayside, N. Y.
INVESTIGATION OF THE CHEMICAL REACTION BETWEEN TUNGSTEN AND ALUMINUM OXIDE, by R. Wallace, J. Florio, and T. Polanyi. Final rept. on Contract AF 19(604)4084. 1 Apr 60, 73p. 24 refs. TR 60-204.6; ERD TR-60-168; AD-243 898.
Order from OTS $2.00 PB 171 373

A tungsten Knudsen cell - oven assembly operable at 2500 C in vacuum was assembled and set in operation. Development steps and performance data are reported in detail. The conversion of a sixty degree ten inch radius, Nier-type gas analytic mass spectrometers to a machine adapted for use in conjunction with a Knudsen cell-oven assembly for the study of high temperature chemical reactions between solids, is reported in detail. Design considerations and constructional features are extensively discussed. The conversion work is specific for an original instrument having a 3.75" source chamber diameter and a downward pointing ion source, however the design considerations have more general applications. This work constitutes the major preliminary instrumental phase for the study of the reaction between tungsten and alumina. The technological importance of this reaction in the electronic industry is reviewed and a short literature survey of pertinent studies presented. The mass spectrometric method of studying high temperature reactions is discussed and the plan for continued work is reviewed in detail. (Author)

Institut Pasteur, Paris (France).
PHOTO-ACTIVATED PRODUCTION OF FREE RADICALS FROM DIATOMIC MOLECULES AFTER ADSORPTION ON METALLIC SURFACES, by C. M. Moser. Annual technical rept. no. 1, 1 Oct 59-30 Sep 60, on Contract DA 91-591-EUC-1298-01-4160-60. [1960] 38p. 4 refs; AD-246 741.
Order from LC mi$3.00, ph$6.30 PB 152 685

A detailed study of the potential curves for various states of carbon monoxide using the simplest set of atomic functions, 1s, 2s and 2p on each center, different possibilities of extending and improving this basis at the observed equilibrium distance for CO (2.1319 a.u.).

Institute for Fluid Dynamics and Applied Mathematics, U. of Maryland, College Park.
ELECTRON DIFFUSION AHEAD OF SHOCK WAVES IN ARGON, by H. D. Weymann. Rept. on Contract AF 49(638)401. Mar 60, 18p. 7 refs. Technical note BN-197; AFOSR-TN-60-334; AD-234 795.
Order from LC mi$2.40, ph$3.30 PB 149 731

Experiments with electrostatic and magnetic probes were performed to investigate the electron diffusion ahead of shock waves of $M_s = 8$ to 12 in argon. Negative electrostatic signals of several volts were obtained with pronounced fronts propagating with velocities of up to several times the shock velocity. The current produced by the diffusing electrons was determined from a measurement of the azimuthal magnetic field and found to be of the order of 10^{-5} amp for $M_s = 12$. Assuming that the electron flow velocity is approximately equal to the velocity of the electrostatic front the measured current corresponds to an electron density of n_e 10^7 cm^{-3} at about 1 m ahead of the shock front. (Author)

Institute for the Study of Metals, U. of Chicago, Ill.
APPARATUS AND METHODS FOR LOW TEMPERATURE HEAT CAPACITY MEASUREMENTS, THE HEAT CAPACITY OF STANDARD BENZOIC ACID, by Arthur G. Cole, John O. Hutchens and others. Technical rept. no. 3 on Contract Nonr-2121(13). [1960] 37p. 11 refs.
Order from LC mi$3.00, ph$6.30 PB 153 765

An apparatus and methods for the measurement of low temperature heat capacities of solids are described. The methods of correcting the data for heat interchange and for thermal gradients within the calorimetric system, as well as other necessary corrections,

are discussed. The heat capacity of a Calorimetry Conference standard sample of benzoic acid has been measured in the temperature range between 10 and 300°K and the results are compared with data from the National Bureau of Standards and from other laboratories. (Author)

Istituto di Fisica, Universitá di Padova (Italy).
IONIC MOBILITY AND RECOMBINATION IN LIQUID HELIUM II. Final technical rept. for 1 Oct 59- Oct 60 on Contract DA 91-591-EUC-1290. [1960] 16p. 3 refs.
Order from LC mi$2.40, ph$3.30 PB 152 608

The research performed under this contract may be devided into two general categories: investigation of the properties of ions in liquid helium, and the use of helium ions in experiments on the hydrodynamic properties of liquid helium. All the work was carried out at temperatures in the helium || region, that is, below 2.19°K. The behavior of the positive and negative ions and their interaction with their solvent, liquid helium was studied through measurements of the mobility and the coefficient of recombination. These measurements have been made at various temperatures and pressures and by various means which will be enumerated below and described more fully in the main body of the report. The two experiments on the flow properties of liquid helium will likewise be described briefly below and more fully in the main report. (Author)

Kentucky U. [Lexington].
N-SULFINYL AMINES. TRANS-SULFINYLATION WITH PRIMARY AMINES, by Walter T. Smith, Jr., William K. Plucknett and Thomas L. Dawson. Rept. on Contract AF 49(638)49. Nov 60, 23p. 11 refs. AFOSR-TN-60-854; AD-246 989.
Order from LC mi$2.70, ph$4.80 PB 153 451

The rates of reaction of N-sulfinylaniline with seven primary aliphatic amines have been determined using a spectrophotometric method based on the absorbance of N-sulfinylaniline at 320 mμ. The trans-sulfinylation reaction takes place in two distinct stages. The data indicate that the first stage is a first order approach to equilibrium and that the second stage is first order with respect to N-sulfinylaniline. The rate of the reaction is increased by increased solvent polarity. Pyridine has a catalytic effect on the second stage of the reaction. (Author)

Michigan U. Coll. of Literature, Science, and the Arts, Ann Arbor.
SPECTROSCOPIC EVIDENCE FOR GASEOUS BENZYNE, by R. Stephen Berry, G. Neil Spokes and R. Martin Stiles. Rept. on Contract AF 49(638)538. Oct 60, 5p. 2 refs. 02878-2-P; AFOSR-TN-60-991; AD-244 841.
Order from LC mi$1.80, ph$1.80 PB 152 611

A volatile precursor of diphenylene from the flash photolysis of benzenediazonium-2-carboxylate has been detected. The short-lived intermediate is tentatively identified as benzyne (1, 2-dehydrobenzene). This assignment follows a consideration of the source of the species, its ultraviolet spectrum, and the rapidity with which it forms gaseous diphenylene.

Naval Research Lab., Washington, D. C.
A THERMODYNAMIC ANALYSIS OF SOLUBILITY IN LIQUID METAL SYSTEMS, by J. L. White. Final rept. on one phase of the problem. 7 Dec 60, 24p. 33 refs. NRL rept. 5555.
Order from OTS $0.75 PB 161 990

Binary liquid-metal solubility equilibria of the type A (in solid or liquid phase) $\rightleftharpoons$ A (in liquid B) are analyzed in terms of the fundamental thermodynamic solution parameters $\Delta\bar{H}^{\infty}_{A(B)}$ and $\Delta\bar{S}^{xs,\infty}_{A(B)}$, the heat and entropy, respectively, of solution of the liquid solute at infinite dilution in the liquid solvent. A general method for the treatment of equilibrium solubility data is developed and is termed the $\sum'$-function method, in view of its similarity to the standard $\sum$-function method for the treatment of vapor-pressure data. By the assumption of subregular behavior of the liquid metal solution, the $\sum'$-function method is applicable to moderately concentrated solution. Consideration is given to details of the application of the method to the three general states of the solute phase: (a) pure solute A, (b) terminal solution of B in A, and (c) intermetallic compound A_xB_{1-x}. The $\sum'$-function method is applied to five binary systems for which data are available in the literature: Mg-Fe, Pb-Ni, Bi-Be, Pb-Zn, and Pb-Cu. The results are in close agreement with the results published in the literature. (Author)

Noyes Chemical Lab., U. of Illinois, Urbana.
A PROTON MAGNETIC RESONANCE STUDY OF CRYSTALLINE POTASSIUM TRISOXALATORHODIUM(III) HYDRATE, by A. L. Porte, H. S. Gutowsky, and G. M. Harris. Technical rept. no. 29 on Contract Nonr-1843(13). 18 Arp 60, 19p. 15 refs. AD-237 052.
Order from LC mi$2.40, ph$3.30 PB 147 776

The broad-line proton magnetic resonance spectrum of crystalline potassium trisoxalatorhodium(III) hydrate, $K_3Rh(C_2O_4)_3 41/2H_2O$, was investigated in the temperature range 77°K-330°K. The spectrum at 77°K indicates that some of the protons in the crystal are not present in water of crystallization and an analysis of this same spectrum indicates that the compound should be reformulated. The formula is not inconsistent with the chemical reactions that the compound undergoes, and it explains some properties which are not satisfactorily accounted for by the previously accepted formula. The absorption spectrum at 318°K substantiates the analysis of the spectrum at 77°K and it also indicates that the water of crystallization can be grouped into at least three sets, the water molecules in different sets having different degrees of mobility. (Author)

Noyes Chemical Lab., U. of Illinois, Urbana.
TEMPERATURE DEPENDENCE OF THE CHLORINE PURE QUADRUPOLE RESONANCE FREQUENCY IN MOLECULAR CRYSTALS, by H. S. Gutowsky and D. W. McCall. Technical rept. no. 20 on Contract Nonr-1834(13). 22 June 59, 22p. 19 refs. AD-220 345.
Order from LC mi$2.70, ph$4.80 PB 150 921

The Cl^{35} pure quadrupole resonance frequency has been observed in polycrystalline CH_2Cl_2, $CHCl_3$, CCl_4, $(CH_3)_3CCl$ and CH_3CCl_3 at temperatures of 77°K and above. In all cases, the resonance frequency

decreases at higher temperatures, in qualitative agreement with Bayer's theory for the torsional motions of the molecules. However, a quantitative comparison of the theory with experiment, including Livingston's results at 4° and 20°K, reveals significant discrepancies which are discussed and attributed mainly to the decrease in torsional frequencies at higher temperatures. The resonance was found to "fade out" at temperatures below the transition points in those solids, CCl_4, $(CH_3)_3CCl$, and CH_3CCl_3, where internal or molecular reorientations are known to occur. In the other compounds the resonance was observable up to the melting point. The origin of this phenomenon is discussed briefly. (Author)

Pennyslvania State U., University Park.
STABILITY RELATIONSHIPS AMONG THE RARE EARTH ACETYLACETONES, by Igmar Grenthe and W. Conrad Fernelius. Technical rept. no. 1 on Contract Nonr-65624. 17 Feb 60, 10p. 12 refs. AD-233 212.
Order from LC mi$1.80, ph$1.80 PB 153 157

Step-wise stoichiometric formation constants have been determined for the reaction between acetylacetone and the rare earths including yttrium. The measurements have been made at a temperature of 30°C in an aqueous perchlorate medium of an ionic strength of 0.1 M. A plot of the logarithm of the first formation constant against the ionic potential shows a linear relation from La to Eu with a change of 0.15 units in log K_1 between consecutive elements. After Gd the complexity remains nearly constant with a total change in log K_1 from Tb to La of 0.2 units. This relation between the ionic potential and log K has been compared with the same relation for other rare earth complexes. (Author)

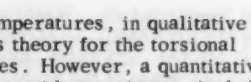
Pennsylvania State [U. Coll.] of Mineral Industries [University Park].
CHEMICAL PROPERTIES OF SOME OXIDE SURFACES, by Dorothy P. Enright. O. N. R. Technical rept. no. 46 on Contract N6onr-269, T. O. 8. Apr 52, 10p. 3 refs. ATI-159 367.
Order from LC mi$1.80, ph$1.80 PB 154 295

This report released for sale to the public 14 Feb 61.

The reactivity of freshly dehydrated silica gel indicates the presence of surface ions which can donate and accept electrons and thus cause oxidation and reduction phenomena. This behavior of the silica surface and of an alumina-silica catalyst has been found also in the reactivity of a partly oxidized graphite surface. (Author)

Princeton U., N. J.
PARAMAGNETIC RESONANCE ABSORPTION IN PEROXO-DICOBALT COMPLEXES, by E. A. V. Ebsworth and J. A. Weil. Rept. on Contract Nonr-1858(27). 15 May 59, 33p. 35 refs. AD-218 013.
Order from LC mi$3.00, ph$6.30 PB 149 648

The paramagnetic resonance spectra of the ions $[(NH_3)_5Co\text{-}O\text{-}O\text{-}Co(NH_3)_5]^{+5}$ and



were studied using various solvents. Under appropriate conditions, 15 hyperfine lines can be resolved in the spectrum of each, showing that the single unpaired electron must interact equally with both cobalt nuclei. The derivative spectra were not in general symmetric, and varied with changes in the acidity, viscosity and temperature of the solvent. These variations are interpreted in terms of anisotropy and relaxation effects. (Author)

Rensselaer Polytechnic Inst., Troy, N. Y.
ALKALI METAL CARBONATES. PART III. SOLID-LIQUID PHASE EQUILIBRIA FOR MIXTURES OF LITHIUM, SODIUM, AND POTASSIUM CARBONATES, by George J. Janz and Max R. Lorenz. Technical rept. no. 5 on Contract Nonr-591(10). Apr 60, 21p. 15 refs. AD-236 206.
Order from LC mi$2.70, ph$4.80 PB 147 045

The liquid-solid phase equilibria for the two binary systems Li, Na/CO_3 and Li, K/CO_3 and the tenary system Li, Na, K/CO_3 are reported. In the Li, Na/CO_3 system it appears that the compound $LiNaCO_3$ melts incongruently at 500.1°C at about 51 mol-% Li_2CO_3 and the eutectic mixture at 500°C and 52 mol-% Li_2CO_3. A compound, $LiKCO_3$, congruently melting at 504.5°C, and two eutectic mixtures at 42.7 and 62.0 mol-% Li_2CO_3 melting at 498° and 488°C respectively were found in the Li, K/CO_3 system. The ternary system is found to have one eutectic mixture, melting at 397°C and of composition 43.5, 31.5, and 25.0 mol-% Li_2CO_3, Na_2CO_3 and K_2CO_3, respectively. The values for the melting points and heats of fusion found in this investigation were 726°, 858°, 898°C and 10.8, 10.3, and 8.5 kcal/mol for Li_2CO_3, Na_2CO_3 and K_2CO_3, respectively. (Author)

Research Labs. for the Engineering Sciences, U. of Virginia, Charlottesville.
IONIZATION YIELD OF LOW-ENERGY HEAVY IONS IN ARGON, by J. A. Phipps, L. C. Towle and R. A. Lowry. Rept. on Contract AF 49(638)22. Oct 60, 20p. 6 refs. Rept. no. EP-4419-105-60U; AFOSR-TN-60-1241; AD-247 075.
Order from LC mi$2.40, ph$3.30 PB 153 356

A cylindrical ionization chamber with a differentially pumped open window has been used to measure the total ionization yield of low energy heavy ions stopped in a gas. The ionization yield of protons in argon in the energy range of 25 to 250 kev was determined earlier. Recent results are presented on the ionization yield of argon and nitrogen ions in argon gas in the energy range of 25 to 100 kev. The average energy per ion pair for argon ions increases rapidly with decreasing energy in the above range and at 50 kev it is about three times the value for 200 kev protons. A comparison of the ionization yields in argon of various ions having velocities in the same region is presented. (Author)

Stanford Research Inst., Menlo Park, Calif.
ENERGIES OF THE GASEOUS ALKALINE EARTH HALIDES, by Daniel Cubicciotti. Technical note no. 7 on Contract AF 49(638)89. Nov 60, 6p. 10 refs.
SRI Proj. 2024; AFOSR-TN-60-1362; AD-247 244.
Order from LC mi$1.80, ph$1.80 PB 153 314

EARTH SCIENCES

Alaska U., College.
RESEARCH AND REPORTS ON AERIAL INTERPRETATION OF TERRESTRIAL BIOENVIRONMENTS AND FAUNAL POPULATIONS, by John L. Buckley and Wilbur L. Libby. Dec 57, 113p. 30 refs. AAL Technical rept. 57-32.
Order from LC mi$6.00, ph$18.30 PB 153 371

A study area of 91,445 square miles in Interior Alaska was selected and 1,923 sample points were located on aerial photographs. The environmental type at each point was identified from low altitude in a light aircraft. Of the points visited, 66.61 per cent fell in Forest; 7.28 per cent in Tall Brush; 13.47 per cent in Dwarf Brush; 7.12 per cent in Herb types; 2.76 per cent in water; and 2.76 per cent on bare ground. These major types were further subdivided and the percentage of each computed; a description of each type is included. Annotated lists of the mammals, birds and fishes of the study area were compiled, based on field work of a four-man crew and on literature records. Tables showing the environmental types in which each of the mammals, birds, and the important species of edible plants can be expected are included. (Author)

Dartmouth Coll., Hanover, N. H.
FIELD AND LABORATORY INVESTIGATIONS OF LAKE, SHELF AND GLACIAL ICE, by J. B. Lyons. Final rept. for 1957-1959 on Contract AF 19(604)2159. 1 Jan 60, 10p. 9 refs. AFCRC-TR-60-205.
Order from LC mi$1.80, ph$1.80 PB 153 480

This is a summary report covering a field investigation of perennially frozen Angiussaq Lake, Northwest Greenland, as a possible year-round landing site; field investigations on T-3, with the objective of relating surface geomorphology and ablation characteristics to the problem of stabilization of runways; and investigations, at Lake Peters, Alaska, on the strength characteristics of melting lake ice. (Author)

Pennsylvania State U. Mineral Industries Experiment Station, University Park.
MODEL STUDIES OF SEISMIC ENERGY DISTRIBUTION AROUND DIFFERENT TYPES OF SOURCE. Quarterly rept. no. 1 on Contract AF 19(604)7383. 30 Nov 60, 6p. AD-247 381
Order from LC mi$1.80, ph$1.80 PB 153 422

The purpose of these experiments is to compare, through the use of models, the seismic pulses to be expected around different types of energy sources such as a fault displacement or an explosion. All experiments are two-dimensional in character, structure being simulated by variations in the thickness or composition of the model. One objective of this investigation is to duplicate actual source conditions for earthquakes as accurately as possible in order to check whether assumed theoretical conditions for which mathematical theory has been developed are confirmed. (Author)

Climatology and Meteorology

Air Force Cambridge Research Labs., Bedford, Mass.
PROGRESS AND PROSPECTS OF RADAR METEOROLOGY, by David Atlas. Guenter Loeser Memorial Lecture. 1957, 39p. GRD TN-60-631.
Order from LC mi$3.00, ph$6.30 PB 153 394

Arctic Aeromedical Lab., Ladd AFB, Alaska.
SOME CONTRIBUTIONS OF SMALL MAMMAL BIOCLIMATE STUDIES TO AIR FORCE NEEDS IN NORTHERN REGIONS, by William O. Pruitt, Jr., Charles V. Lucier, and L. L. Hufman. [1956] 25p. 10 refs. Technical note AAL-TN-56-8.
Order from LC mi$2.70, ph$4.80 PB 153 514

Army Signal Research and Development Lab., Fort Monmouth, N. J.
ACCURACY OF TWO-THEODOLITE PILOT BALLOON TRACKING METHOD OF MEASURING LOW-LEVEL WINDS, by Ralph W. Armstrong. 22 June 59, 71p. 4 refs. USASRDL Technical rept. 2047. AD-219 319.
Order from LC mi$4.50, ph$12.30 PB 150 705

An investigation of the maximum error to be expected in low-level wind-velocity measurements by the two-theodolite balloon-tracking method was made, assuming a maximum value for the theodolite angle errors and that the error in time interval between theodolite readings and in length of the base line can be made negligible. Results are presented chiefly in the form of balloon horizontal displacement errors between theodolite readings (as a function of balloon position with respect to the theodolite base line), since these displacement errors can be divided by any selected time interval between readings to give error in measured wind velocity. (Author)

California U., Los Angeles.
ANALYTICAL STUDIES OF NUMERICAL ERRORS IN DYNAMICAL WEATHER PREDICTION, by W. Lawrence Gates. Final rept. for 1 July 58-31 Oct 60 on Contracts AF 19(604)3886 and 4965. 31 Oct 60, 53p. 3 refs. AFCRL-TR-60-412.
Order from LC mi$3.60, ph$9.30 PB 153 204

Contents:
The reduction of the oscillation phenomena (weak instability) of first-forward-then-centered time differences by a special starting procedure
The reduction of truncation error by extrapolation techniques
The distortion of baroclinic instability criteria by finite differences

Chicago U. [Ill.]
DESIGN OF A THREE-DIMENSIONAL MESO-METEOROLOGICAL NETWORK, by Tetsuya Fujita and Henry A. Brown. Quarterly technical rept. no. 4, 1 Jan-30 Apr 60, on Contract DA 36-039-sc-78901. [1960] 132p. AD-242 802.
Order from LC mi$6.90, ph$21.30 PB 153 232

Results of case studies of numerous networks in various locations are combined in a discussion of the observations necessary for the operation of a three-dimensional mesometeorological network. Four observational categories are considered: (1) surface, (2) upper air, (3) radar, and (4) photography. Each category is discussed in terms of the elements measured, optimum time and space resolution, accuracy required, and techniques for analysis. A model network design incorporating the above results is then proposed. This is followed by a proposed practical design for three different areas in the US characterized by coastal, plains, and mountainous environments. (Author)

Cornell U. Medical Coll., New York.
MEASUREMENT OF THE RADIANT HEAT LOAD ON MAN IN SUMMER AND WINTER ALASKAN CLIMATES, by James D. Hardy and Alice M. Stoll. Special rept. Nov 53, 46p. 14 refs.
Order from LC mi$3.30, ph$7.80 PB 153 324

Radiant environmental temperature was observed to range from +51°C (+124°F) in summer to -79°C (-110°F) in winter. Heat load on man due to thermal radiation is important, being equivalent to adding 10-20°C to thermometer (air temperature) reading in summer and subtracting a similar amount in winter. Climatic chambers used for testing field equipment should be arranged to take into account these differences. Large changes in environmental radiant temperature (10-40°C) occur that are not registered by any presently used meteorological instruments. These changes can be correlated with alterations in water vapor content and air temperature of the upper atmosphere. The radiant temperature may thus be useful in studies of weather. (Author)

Danish Meteorological Inst., Charlottenlund.
INVESTIGATIONS ON THE DURATION OF SUNSHINE IN GREENLAND BY OPERATING 11 (ELEVEN) SUNSHINE STATIONS, UTILIZING CAMPBELL-STOKES RECORDERS. FURTHER: MEASUREMENTS OF SUNSHINE INTENSITY AT (PROVISIONALLY) ONE SINGLE STATION IN GREENLAND, by Karl Andersen. Final technical rept. for 1 Oct 59-30 Sep 60 on Contract DA 91-591-EUC-1216. 31 Oct 60, 3p.
Order from LC mi$1.80, ph$1.80 PB 153 093

Illinois State Water Survey, Urbana.
STUDY ON INTENSITY OF SURFACE PRECIPITATION USING RADAR INSTRUMENTATION, by E. A. Mueller and G. E. Stout. Quarterly technical rept. no. 9, 1 Apr-30 June 60, on Contract DA 36-039-sc-75055. [1960] 19p. AD-244 324.
Order from LC mi$2.40, ph$3.30 PB 153 239

A total of 34 rolls of raindrop camera film was received from the three overseas installations during the quarter. The Majuro installation was dismantled and returned June 3, 1960, to Illinois for refurbishing and reinstallation. Operations at the other locations - Indonesia and Alaska - were satisfactory during the quarter. A total of 27 rolls of raindrop data film was measured during the quarter. The preliminary calculation of the radar variables was accomplished as the film was measured. A paper for the 187th National Meeting of the American Meteorological Society at Eugene, Oregon, was prepared. Both CPS-9 and TPS-10 radars were in routine operation during the quarter. The CPS-9 was operated a total of 616 hrs. No major maintenance difficulties were experienced with either radar. (Author)

Intermountain Weather, Inc., Salt Lake City, Utah.
CALCULATION OF INFRARED RADIATIVE FLUX EMISSION OF THE EARTH PLUS ATMOSPHERE AT VARIOUS LEVELS HIGH ABOVE THE EARTH, by J. Vern Hales, Thomas L. Williams, and Donald Henderson. Final rept. on Contract AF 19(604)2418. Aug 60, 65p. 21 refs. AFCRL-TR-60-405.
Order from LC mi$3.90, ph$10.80 PB 153 634

This work has proceeded in four phases: (1) Calculation of the infrared radiative flux emission of the earth plus atmosphere at a level sufficiently high that all radiative gases are below the point of calculation, but still so low that the earth is for all practical purposes an infinite plain below the point of calculation. (2) Calculation of the infrared radiative flux emission of the earth plus atmosphere at various altitudes so high that the sphericity of the earth becomes an important consideration in the calculation. (3) Inasmuch as the radiative flux calculations are extremely laborious an effort has been made to reduce them to standard procedures for manual operation or for calculation using high speed computers, with the result that they now can be accomplished quickly and almost automatically as far as human labor is concerned. (4) In order to check the accuracy of the Elsasser (1960) charts being used and to permit the calculation of the infrared radiative flux emission in various portions of the infrared spectrum, a technique has been developed of calculating and using new radiation charts developed for specific spectrum intervals.

Lockheed Aircraft Corp., Sunnyvale, Calif.
ATMOSPHERIC OZONE: ITS DETECTION, MEASUREMENT AND EFFECTS, 1940 TO 1959. AN ANNOTATED BIBLIOGRAPHY, by A. A. Beltran. 1 July 60, 63p. 154 refs. SRB-60-3; AD-241 588.
Order from LC mi$3.90, ph$10.80 PB 153 437

The sources consulted include the card catalog of the Armed Forces Technical Information Agency, the various catalogs of LMSD's Technical Information Center, Meteorological Abstracts and Bibliography, Science Abstracts, Section A - Physics, ASTIA Technical Abstract Bulletin, and University of Pittsburgh, Scientific Reprot No. 1 - The Spectra and Chemical Kinetics of the Upper Atmosphere, A Literature Survey, Vols. I to VI. (Author)

McGill U. (Canada).
THE ARCTIC CIRCULATION. A PRELIMINARY REVIEW, by F. Kenneth Hare and S. Orvig. Supplement to Final rept. on Contracts AF 19(604)1141 and AF 19(604)1868. 30 June 58, 232p. 129 refs. Arctic Meteorology Research Group Pub. in Meteorology no. 12; AFCRC TN-58-486.
Order from LC mi$10.20, ph$36.30 PB 150 723

This report is a review of the climatology of the northern atmospheric circulation from sea-level up to 30 km. The treatment is mainly descriptive, and makes no attempt to be a study bearing on the general circulation problems at large.

Texas A. and M. Coll., College Station.
WIND FIELD NEAR THE TROPOPAUSE, by W. J. Saucier, K. C. Brundidge and others. Final rept. on Contract AF 19(604)1565. Dec 58, 147P. 62 refs. Reference 58-26F; AFCRC-TR-59-222; AD-211 496.
Order from LC mi$7.20, ph$22.80 PB 150 691

This rept. includes:
Summary of wind distributions in the jet streams of southeast United States investigated by project jet stream, by W. J. Saucier.
Clear-air turbulence and bumpiness, by Iver Dugstad.
A study of the duration of clear-air turbulence near the jet stream and its relation to horizontal temperature gradients, by N. W. Cunningham.
Some new jet stream models, by K. C. Brundidge and J. L. Goldman.
A further study of jet stream turbulence, by Tommy E. Sanford.

Willow Run Labs., U. of Michigan, Ann Arbor.
SCINTILLATION AND VISUAL RESOLUTION OVER THE GROUND, by Frank R. Bellaire and Floyd C. Elder. Rept. on Proj. Michigan, Contract DA 36-039-sc-78801. Oct 60, 51p. 20 refs. Rept. no. 2900-134-T; AD-245 118.
Order from LC mi$3.60, ph$9.30 PB 152 682

The scintillation, or the fluctuation in the intensity, of the light from a constant target source, affects visual resolution and therefore reduces the usefulness of optical devices. The deterioration of visual resolution due to scintillation can be caused by atmospheric conditions near the ground and the character of the underlying ground surface. An experimental study is being conducted to determine the meteorological conditions and other contributing factors which are significant in producing scintillation and thereby reducing visual resolution. In order to limit the number of variables, the experiment has been carried out over level terrain with a uniform ground cover and under relatively uniform weather conditions. Scintillation appears to be primarily a function of the vertical temperature gradient and the vertical motions within the ground layers of the atmosphere. These factors are interrelated and are, furthermore, complicated functions of other meteorological parameters, the experimental arrangement, and the character and roughness of the ground surface. (Author)

Wisconsin U., Madison.
LINEAR PREDICTION OF UPPER WINDS AFTER STRATIFICATION, by Donald R. Johnson and Reid A. Bryson. Scientific rept. no. 3 on Contract AF 19(604)5191. May 60, 45p. 12 refs. AFCRC-TN-60-467.
Order from LC mi$3.30, ph$7.80 PB 153 607

This study represents an initial inquiry into the accuracy with which upper winds may be forecast using simple stratification methods. Non-stratified climatic prediction of the 300 mb winds over southern European Russia was compared with non-stratified linear prediction using upper winds at selected areas as predictors. After stratification of the data by groups of Grosswetter types, stratified climatological forecasts and stratified linear prediction were compared with the initial results of no stratification. For the methods used in this study we can conclude that while the stratification used here does not give a better climatological forecast, it does improve the results of linear prediction. (Author)

Oceanography

Dartmouth Coll., Hanover, N. H.
LIMNOLOGICAL STUDIES ON LAKES PETERS AND SCHRADER, ALASKA, by John E. Hobbie. Scientific rept. #5 for July-Aug 58 on Contract AF 19(604)2159. 1 Mar 60, 53p. 33 refs. AFCRC-TN-60-261; AD-234 481.
Order from LC mi$3.60, ph$9.30 PB 153 481

Limnological studies of two Alaskan Arctic lakes are presented which are located on the north slope of the Brooks Range. (Author)

New York U. Coll. of Engineering, N. Y.
OPERATING PROCEDURES FOR COMPUTING ZERO AND ORDINATE CROSSINGS OF STATIONARY GAUSSIAN NOISE USING AN IBM 650 CALCULATOR, by Raymond G. Stevens. Technical rept. no. 2 on Contract NObs-72018. Aug 59, 26p. 4 refs. AD-231 464.
Order from LC mi$2.70, ph$4.80 PB 150 060

The operation of a group of computer programs for calculating estimates of the zero crossing distribution of a random stationary process is described. These programs were developed and used for the calculation of zero crossing distributions of ocean wave records. For this purpose a comparison of various methods of zero crossing estimation was undertaken. While some methods are obviously superior to others the entire group of programs is included so that similar comparisons can be undertaken if desired. The scope is limited to a description of the computer program operation, but a brief outline of the technique is included. (Author)

Woods Hole Oceanographic Institution, Mass.
BEACH STUDIES IN THE CAPE COD AREA, by John M. Zeigler. Final rept. for Aug 53-Apr 60 on Contract Nonr-1254(00). Apr 60, 73p. 23 refs. Reference 60-20; AD-236 811.
Order from LC mi$4.50, ph$12.30 PB 147 311

Cape Cod beaches become steep and full in summer and are quite variable at other times. Variations in beach elevation can be extreme. Sediment sampling along offshore profiles concludes that the deposition of sediment is confined to a thin strip of sand next to the coast and a mud zone far offshore. These are separated by a zone of erosion or non-deposition.

Woods Hole Oceanographic Institution, Mass.
OCEANOGRAPHIC DATA FROM ATLANTIS CRUISE 247, JANUARY-JUNE, 1959 FOR THE INTERNATIONAL GEOPHYSICAL YEAR OF 1957-58, by Arthur R. Miller. Technical rept. on Contract Nonr-2196(00) and National Science Foundation Grant Y/9.5/80. Mar 60, 143p. 9 refs. Ref. no. 60-40; AD-244 957.
Order from LC mi$7.20, ph$22.80 PB 153 762

Profiles of temperature, salinity, and oxygen and the accompanying data for sections accomplished during Cruise 247 of the Research Vessel ATLANTIS are reported. Data from shallow water off the mouth of the Rio de la Plata and from ten other stations are also included. Profiles of density (sigma t) are included, and approximately 2400 bathythermograph slides are reproduced. (Author)

Woods Hole Oceanographic Institution, Mass.
PROCEEDINGS OF THE CONFERENCE ON AUTOMATIC DATA HANDLING FOR OCEANOGRAPHIC OBSERVATIONS, WOODS HOLE, MASSACHUSETTS, OCTOBER 8, AND 9, 1959. Technical rept. on Contract Nonr-2734(00). Feb 60, 16p. 3 refs. Ref. no. 60-10; AD-233 434.
Order from LC mi$2.40, ph$3.30 PB 153 134

A conference was convened to discuss the application of automatic data handling techniques to oceanographic observations. The participants had indicated either a need for, or had particular interest in a truly flexible and economical means for the acquisition, recording and reduction of a relatively large number of channels of data. The WHOI data handling system was described in some detail. The advantages of this and similar type systems were discussed according to some of the particular requirements of the conferees. The areas of discussion are as follows: (1) a generalized description of data acquisition, storage, reduction and analysis; (2) description of WHOI system; (3) inter-range instrumentation group standards, (4) extended applications of WHOI or similar systems; (5) data acquisition over long time periods; and (6) standardization. (Author)

Physics of the Atmosphere

Cornell U. School of Electrical Engineering, Ithaca, N. Y.
STUDIES ON PROPAGATION IN THE IONOSPHERE, by H. G. Booker, D. Farley and J. Renau. Final rept. on Contract DA 36-039-sc-78258. 30 Oct 59, 278p. 149 refs. Research rept. EE 433.
Order from LC mi$11.10, ph$42.60 PB 150 071

The theoretical investigation of electrostatic fields in the ionosphere was completed. It was concluded that, under certain conditions, significant electrostatic coupling between the E and F regions of the ionosphere can occur at all latitudes. However, the small scale electrostatic fields created by irregular winds below 200 km are likely to be rather weak. It appears unlikely that the strength, in the F region, of the irregular electric field could exceed 10^{-3} v/m. The possibility that this electric field might create irregularities of electron density in the F region was examined. It was found that irregularities could not be created near the geomagnetic poles, but that rather weak irregularities (deviations of a per cent or two) might be formed at lower latitudes. A historical review of scatter echoes is presented and the problems to be considered are summarized. The types of frequently observed spread echoes are illustrated and described. An explanation is given for sporadic echoes. Frequently observed equatorial spread echoes can be explained on the basis of backscattered echoes from all directions. In a morphological study of spread echoes it is shown that types of spread echoes commonly observed in the northern stations consist of superposition of overhead and oblique specular reflections. The same type of spread can be caused by the bifurcation of the F layer. (Author)

Georgia U., Athens.
SPECTROGRAPHIC DATA OBTAINED FROM SODIUM AND CESIUM CLOUDS IN THE UPPER ATMOSPHERE (I). SPECTRA OF ARGON OXIDE, KRYPTON OXIDE AND XENON OXIDE (II), by C. Dewey Cooper. Final rept. on Contract AF 19(604)1562. 11 Dec 59, 34p. 21 refs. AFCRC TR-59-[405] AD-231 895.
Order from LC mi$3.00, ph$6.30 PB 150 721

Spectrographic evidence is provided for the resonant scattering of sunlight by a sodium cloud which was placed in the upper atmosphere at twilight. The relative intensity of the 5893A and 3303A sodium lines provides conclusive results that the sodium twilight flash results from resonant scattering of sunlight. In similar experiments, cesium clouds radiate resonant lines at 8525A, 4593A, 4555A, 3876A, and 3611A. When traces of oxygen are added to 1 atm of Ar, Kr, or Xe and each mixture is excited in a discharge tube, characteristic spectra appear near the 5577A ($^1S_0 - {}^1D_0$) line. These spectra are associated with rare-gas oxygen molecules which may be formed with oxygen in the $^1S_0$ or $^1D_0$ state. Many of the rotational lines of these bands were resolved, but the overlapping of bands prevented a complete rotational analysis. (Author)
Included in the report are:
3303 A emission from sodium ejected into the upper atmosphere, by C. Dewey Cooper, pub. in the Jnl. of Geophysical Research 63: 369-371, June 58
Spectra of argon, oxygen, and nitrogen mixtures, by C. Dewey Cooper, pub. in the Physical Review 109: 2026-2028, 15 Mar 58.

Ionosphere Research Lab., Pennsylvania State U., University Park.
IONOSPHERIC EFFECTS OF SOLAR FLARES. II: IONIZATION MODELS, by A. P. Mitra. Scientific rept. no. 142 on Ionospheric Research, Contract AF 19(604)3875. 1 Dec 60, 54p. 24 refs. AFCRL-TN-60-691; AD-246 308.
Order from LC mi$3.60, ph$9.30 PB 153 197

Current theories of flare ionization are reviewed with particular consideration of Lα and hard X-rays. Models of flare produced ionization are then deduced with reference to various height levels in the lower ionosphere, constituents ionized and solar flare radiations effective. Agreement with other workers is reached with regards to very low height ionization enhancements as being due, primarily, to hard X-rays. Evidence is given for a flash of Lα near the start of a flare as being most effective near the base of the E-layer. (Author)

Lincoln Lab., Mass. Inst. of Tech., Lexington.
THE DISTRIBUTION OF ELECTRONS IN THE UPPER IONOSPHERE FROM BACKSCATTER OBSERVATIONS, by J. V. Evans. Rept. on Contract AF 19(604)7400. 23 Nov 60, 21p. 44 refs. 3G-0002.
Order from LC mi$2.70, ph$4.80 PB 153 484

This report summarizes the methods by which information has been obtained concerning the distribution of electrons above the level at the critical frequency of the F2 region. Profiles of the electron density obtained from rocket firings and by other techniques are compared with some of the results obtained by Pineo et al from observations of ionospheric backscatter at Millstone Hill. It is found that most methods yield profiles in which the electron density diminishes only as rapidly or less rapidly than that in a Chapman region. The results obtained by Pineo, however, always indicate a more rapid decay than predicted by the Chapman theory. There is also a discrepancy between the profiles obtained by Pineo et al when the telescope is (a) in the zenith, and (b) at an elevation of 15°. The density measurements do not agree for the region beyond 400 Kms height. It is not yet possible to say if the difference reported here, between the results of backscatter experiments and the results of other workers, reflects real changes in the shape of this region which may be a function of time or latitude. (Author)

MacDonald Physics Lab., McGill U. (Canada).
ON THE MEASUREMENT OF CLOUD TEMPERATURES FROM THE GROUND BY INFRA-RED RADIATION, by Walter Hitschfeld. Rept. on Contract AF 19(604)2065. Oct 60, 11p. 4 refs. Stormy Weather Research Group Technical note MWT-4; AFCRL TN-60-670; AD-246 048.
Order from LC mi$2.40, ph$3.30 PB 153 061

Systematic photographic observations have become important means of studying the mechanisms involved in cloud development, especially in cumulus. It is felt that these techniques could be augmented easily by cloud temperature measurements, based on the infrared emission from the cloud drops. This note is a discussion of a few such measurements, using a Golay cell and a chopped beam.

National Bureau of Standards, Boulder, Colo.
A SURVEY OF SPREAD-F, by F. N. Glover. Nov 60, 72p. 109 refs. Technical note no. 82.
Order from OTS $1.75 PB 161 583

Examples of spread-F forms occurring at different latitudes are presented, illustrating the classification of spread into range type and frequency type. The occurrence patterns of spread-F at different latitudes are correlated with other geophysical phenomena. Magnetic latitude and time within the sunspot cycle appreciably affect the pattern of spread occurrence. Instrumental techniques and their advantages for spread studies are outlined. The principal theoretical explanations of spread-F are summarized. A single mechanism need not be postulated as responsible for all types of spread occurrence or at all latitudes. (Author)

Ohio State U. Research Foundation, Columbus.
INFRARED ABSORPTION BY MINOR ATMOSPHERIC CONSTITUENTS, by Darrell E. Burch and Dudley Williams. Scientific rept. no. 1 on Contract AF 19(604)2633. Aug 60, 158p. 24 refs. RF Proj. 778; AFCRL TN-60-674.
Order from LC mi$7.50, ph$24.30 PB 153 283

The work has dealt with the infrared absorption of the minor atmospheric gases nitrous oxide, carbon monoxide, and methane. Samples consisting of these gases alone and in binary mixtures with nitrogen have been investigated over wide ranges of absorber concentration w and total pressure P. From the observed absorption for each band, it has been possible to present curves showing total absorption $\int A(\nu)d\nu$ for various values of absorber concentration as a function of equivalent pressure P_e, which is a parameter that includes the total pressure P and a small additional term proportional to the partial pressure of the absorbing gas; the magnitude of the additional term is also dependent on the value of a "self-broadening coefficient," defined in the report and measured experimentally for each absorption band. Another set of curves for each band shows the total absorption for various equivalent pressures as a function of absorber concentration. The curves provide a basis for the prediction of total absorption for any values of w and P_e included in the wide range of these parameters covered in the study. Extensive tables included at the end of the report provide additional absorption data for use by other investigators who may be interested in atmospheric transmission or in more general problems of absorption. (Author)

Ohio State U. Research Foundation, Columbus.
INFRARED STUDIES OF THE ATMOSPHERE, 1954-1957, by J. H. Shaw, D. E. Burch and others. Final rept. on Contract AF 19(604)1003. Jan 58, 81p. 85 refs. AFCRC-TR-58-233; AD-152 546.
Order from LC mi$4.80, ph$13.80 PB 150 697

This report released for sale to the public 9 Feb 61.

The results of a 3-year program of investigating the atmosphere and atmospheric gases by infrared techniques are described. Studies have been conducted on the variations in abundance of atmospheric CO and of the abundance of N_2O at ground level. High-resolution spectra

of bands of CO_2, O_3, N_2O, NO, C_2H_2 and NH_3 have been analyzed. Measurements of the growth of single lines of CO have been made, and investigations of the emission spectrum of the earth's atmosphere in the region 4μ to 22μ and of the spectrum of Mars in the PbS region have been undertaken.
Included in the report are:
The emission spectrum of the earth's atmosphere from 4μ to 22μ, pub. in Mémoires Soc. R. Liège 18:42-47
Infrared evidence for the presence of ozone in the lower atmosphere, pub. in Jnl. of the Optical Society of America 46:360-361, May 56
Thermal radiation from the atmosphere, pub. in Jnl. of the Optical Society of America 46:543-547, July 56
Absorption bands of N_2O near 4.5μ, pub. in The Jnl. of Chemical Physics 23:1887-1888, Oct 55
Nitric oxide fundamental, pub. in The Jnl. of Chemical Physics 24:399-402, Feb 56
Infrared emission spectra of the atmosphere between 14.5μ and 22.5μ, pub. in Jnl. of the Optical Society of America 47:227-229, Mar 57
Some comments on two articles by Taylor and Yates, pub. in Jnl. of the Optical Society of America 47:441, May 57
Combination band $\nu_4 + \nu_5$ of acetylene, pub. in The Jnl. of Chemical Physics 25:607, Sep 56
Infrared spectrum and molecular constants of carbon dioxide. Part I. ν_2 of $C^{12}O_2^{16}$ at 15μ. Part II. Levels 10^0O and $02^0 0$, $10^0 1$ and $02^0 1$ coupled by Fermi resonance, pub. in The Jnl. of Chemical Physics 24:103-105, 1007-1008, 1956
Infrared emission spectrum of the atmosphere, pub. in Jnl. of the Optical Society of America 45:455-460, June 55.

Pennsylvania U. School of Medicine, Philadelphia.
RADIANT TEMPERATURE OF THE SKY AT HIGH ALTITUDE, by H. T. Hammel. Special rept. Dec 54, 5p. 2 refs. AAL proj. no. 7-7951.
Order from LC mi$1.80, ph$1.80 PB 153 334

To obtain more evidence upon the question of the minimum radiant temperature of the sky in the complete absence of a water shield, the present study to measure the radiant temperature at high altitude was undertaken.

ENGINEERING

Aeronautical Engineering

Aeronautical Turbine Lab., Naval Air Turbine Test Station, Trenton, N. J.
DETERMINATION OF CAUSES OF ENGINE FAILURES INCURRED IN SERVICE OPERATION OF F3H-2N AIRCRAFT. PHASE VII. OPERATING CHARACTERISTICS OF J71 TURBOJET ENGINES WITH WATER INGESTION AND UNDER ICING CONDITIONS. PART 4. EVALUATION OF ANTI-ICING CHARACTERISTICS, by A. Kush. Rept. on Proj. TED-ATTS-RAPP-2007.1; Sep 60, 37p. 5 refs. NATTS-ATL-47; AD-246 410.
Order from LC mi$3.00, ph$6.30 PB 153 289

Airborne Instruments Lab., Deer Park, N. Y.
AIRPORT RUNWAY AND TAXIWAY DESIGN: EXCERPTS ON TYPICAL CONFIGURATIONS, CAPACITIES, EVALUATION OF DESIGN, by M. A. Warskow, H. P. Galliher and others. Rept. on Contract FAA/BRD-136. July 60, 188p. 11 refs. Rept. no. 7601-H-1.
Order from OTS $3.00 PB 171 370

Airport operations at numerous civil airports have been observed and measured. The data have been analyzed to identify the elements important to airport capacity and that cause delay to operations, and to identify and evaluate aircraft spacing intervals. A particularly interesting result of the field observations was the ability to document the so-called "pressure factor"--that factor that evidences itself in higher efficiency at higher operating rates. Controllers and pilots, sensitive to the tempo of the operation, reduce the spacings and react more promptly to traffic control. Thus, as the airport operating rate increases, the delay build-up is less pronounced than the increase in the operating rate would indicate. It has been found useful to study airports by analyzing the delay to operations that results from various movement rates rather than maximum capacity ratings since, from a practical standpoint, operations at maximum capacity are not observable. The multiplicity of airport designs around the country have been examined to determine which are typical. The mathematical formulas developed have been applied to airport configurations to determine which are typical and will best satisfy general airport needs. A guide for the application of the mathematical formulas is provided that indicates how the operational elements are selected and how computations are made.

Bell Helicopter Corp., Fort Worth, Tex.
WADC RAPID PERFORMANCE PREDICTION METHOD FOR COMPOUND TYPE ROTOCRAFT, by Robert D. Foster. Rept. for May 55-Oct 56 on Contract AF 33(616)2895. Mar 59, 159p. 10 refs. WADC Technical rept. 55-410; AD-110 608.
Order from LC mi$7.50, ph$24.30 PB 154 405

This report released for sale to the public 16 Feb 61.

A method for rapid estimation of the flight performance of compound type rotorcraft is developed. This method makes extensive use of nomograms to avoid lengthy computations. The method is based on familiar helicopter theory modified to include the effect of interaction between wings and rotors. A method for determining the distribution of the load between the wing and rotor is developed and included as an integral part of the method. Provision is also made for including the effects of auxiliary power, or thrust, which may be available in forward flight. Provisions are made for calculating rate of climb, both vertical and maximum, and rotor limited forward speed. The charts are particularly useful for rapid assessment of new designs, and in estimating the effect of varying design parameters of both new and existing designs. Only standard parameters are used. Sample calculations for different types of rotorcraft are given. (Author)

Courtney and Co., Philadelphia, Pa.
HUMAN FACTORS CONSIDERATIONS IN THE DESIGN OF AIRPORT TRAFFIC CONTROL QUARTERS, by Anthony W. Silvestro, John B. Kelly, and Douglas Courtney. Interim rept. no. 2 on Preliminary Engineering Layouts, Contract FAA/BRD-89. 1 June 59, 70p. Rept. no. 27.
Order from LC mi$3.90, ph$10.80 PB 150 920

There are five important assumptions underlying the presentation of this report. Assumption (1) is that this report is a human factors report as opposed to an engineering report. Assumption (2) is that the human factors considerations have been met by a fully modular design. Assumption (3) is that we are preparing a design in terms of a Class I airport. Assumption (4) is that these recommendations cannot be considered final until they have been placed in some simulated form. Assumption (5) concerns the relation of these recommendations to current and future TSO's. (Technical Standard Orders) One of the basic reasons for carrying out this project was to bring to current and hence future TSO's full consideration of the human operator, at the same time incorporating the extensive experience and background that has led to the formulation of the current TSO's. In order to establish a sensible and acceptable compromise between equipment and engineering requirements and the requirements of the human operator.

Engineering Div., Air [Materiel] Command [Wright-Patterson AFB] Ohio.
CONFERENCES WITH M. HENRI COANDA IN PARIS, FRANCE, by Carl E. Reichert. Memo. rept. 15 Mar 46, declassified 21 Dec 51, 13p. Serial no. TSEAC4-44621-5-1; ATI-152 755.
Order from LC mi$2.40, ph$3.30 PB 154 292

This report released for sale to the public 14 Feb 61.

Hiller Aircraft Corp., Palo Alto, Calif.
VTOL DOWNWASH IMPINGMENT STUDY, VELOCITY SURVEY, by A. Morse. Rept. on Contract DA 44-177-tc-500. Aug 60, 91p. 87 refs. Hiller rept. no. 60-15; TREC Technical rept. 60-58; AD-246 306.
Order from LC mi$5.40, ph$15.30 PB 153 083

In preparation for evaluating the effects and hazards of operating VTOL aircraft from non-surfaced landing areas, velocity surveys and flow pattern studies of an air jet impinging on a flat non-eroding surface were conducted. A mobile test rig, mounting either a five-foot diameter propeller, producing disk loadings of 1.73 lb/sq ft to 7.7 lb/sq ft, or a two-foot diameter ducted fan, producing disk loadings of 15 lb/sq ft to 145 lb/sq ft, at height to diameter ratios from one quarter to four and thrust angle inclinations of 0, 30 and 60 degrees, was used. Pitot and venturi tubes measured velocities abova the surface from the jet centerline to 16 radii. Tuft boards indicated flow patterns. The ratio of the surface dynamic pressure to the mean duct exit dynamic pressure was found to be independent of disk loading, and to be a maximum approximately one diameter from the impingement point. For duct exit heights greater than six tenths of the diameter the maximum surface dynamic pressure is approximately equal to the maximum dynamic pressure that would be found in the same plane providing no impingement surface was present. If the duct exit is brought progressively closer to the ground plane the surface dynamic pressure increases more rapidly than the jet decay would indicate. At a height to diameter ratio of 0.25 the surface dynamic pressure is twenty-five percent greater than the maximum jet decay dynamic pressure. (Author)

Institute of Transportation and Traffic Engineering, U. of California, Berkeley.
EXIT TAXIWAY LOCATIONS, by R. Horonjeff, R. R. Read and G. Ahlborn. Rept. on Contract FAA/BRD-4. Sep 60, 24p. 5 refs.
Order from OTS $0.75 PB 171 369

Based on landing performance, the transport aircraft types using the nation's airports are grouped into 3 classes. If the arriving aircraft are made up of all 3 classes of aircraft, the exit locations are virtually independent of the proportion of each class to the whole. The number of exits required depends on the aircraft population. The location of an exit taxiway need not be fixed at a specific distance from runway threshold because a certain amount of variation does not affect the acceptance rates a great deal. The most desirable exit taxiway locations for runway acceptance for the 3 classes of aircraft at sea level are: large turbo jet transports, 5,800-6,000 ft.; four-engine propeller-driven transports and twin-engine turbo-jet transports, 4,000-4,200 ft.; twin-engine propeller-driven transports and the larger twin-engine general aviation aircraft, 2,600-2,800 ft.

Lockheed Aircraft Corp., Sunnyvale, Calif.
HEAT SINKS: MATERIALS, comp. by Maureen Pearcy. Special bibliography for 1949-1960. 17 Aug 60, 32p. 88 refs. SB-60-29; AD-244 262.
Order from OTS $1.00 PB 171 372

These 88 bibliographical references are concerned with thermal conductivities of materials for heat sink systems in space and re-entry vehicles. The period covered is 1949-1960. The materials include metals, liquid metals, alloys, metal compounds, semiconductors, ceramic materials, plastics, carbon, and gases. Characteristics studied are thermal and electrical conductivities, IR photoconductivity, magnetic and thermodynamic properties, and crystal structure. References are also included for apparatus to measure thermal conductivity, thermal expansion, and specific heat of metals, ceramics, and semiconductors.

Lockheed Aircraft Corp., Sunnyvale, Calif.
A STUDY OF CALIBRATION PROCEDURES FOR HYPERSONIC, HIGH-TEMPERATURE WIND TUNNELS, by S. E. Neice and R. W. Rutowski. Technical note on Flight Sciences. July 60, 18p. 9 refs. LMSD-703047; AD-241 909.
Order from LC mi$2.40, ph$3.30 PB 153 435

Procedures for calibrating hypersonic, high-temperature wind tunnels, using measured reservoir and stagnation-point quantities, along with a Mollier diagram for equilibrium air, are described. The procedures are especially applicable to spark-heated and

reflected shock tunnels. Three methods are considered for the establishment of the equilibrium state of the reservoir and stagnation region through the use of different combinations of measured pressure, density, and heat transfer rates. The determination of the free stream properties, corresponding to the established reservoir and stagnation conditions, is demonstrated Certain simplifying assumptions applicable to low-density flows and wind tunnels employing very large expansions to low free stream temperatures are discussed. (Author)

Michigan U. Research Inst., Ann Arbor.
AN EXTENDED EULER ANGLE COORDINATE SYSTEM FOR USE WITH ALL-ATTITUDE AIRCRAFT SIMULATORS, by D. T. Greenwood. Rept. on Training Equipment Simulators and Techniques for Air Force Systems, Contract AF 33(616)5664. Aug 60, 30p. 5 refs. WADD Technical rept. 60-372.
Order from OTS $0.75 PB 171 404

This report considers the problem of finding a suitable coordinate system for representing orientation. The new extended Euler angle system is compared with other coordinate systems (ordinary Euler angle system, reversed Euler angle system, and quaternion system), particularly with respect to the output variables and the amount of analog computer equipment required for simulator representation. The extended Euler angle system requires the most equipment but has the advantage of being an all-attitude system with outputs convenient for cockpit display. (Author)

Naval Civil Engineering Lab., Port Hueneme, Calif.
EFFECTS OF JET-ENGINE EXHAUST ON VIRGINIA DIABASE CONCRETE PAVEMENT, by H. Tomita. Final rept. 14 Nov 60, 20p. 2 refs. Technical rept. R-089; AD-246 589.
Order from LC mi$2.40, ph$3.30 PB 153 178

In coordination with a National Bureau of Standards' study on the refractory qualities of concrete, NCEL conducted a study to determine the resistance of Virginia diabase concrete to thermal shock from jet aircraft operations. In simulated field tests, concrete slabs and beams were subjected to the exhaust of a jet engine. The slabs spalled during the afterburner power level of the first exposure cycle, with recorded surface temperatures of 900 to 1000 degrees Fahrenheit. Subsequent exposures resulted in no additional spalling. The 6-inch by 6-inch by 24-inch beams showed no spalling during three cycles of exposure but suffered reduction in flexural and compressive strengths. The Virginia diabase concrete did not possess the necessary refractory qualities and flexural strength requirements. Its use is not recommended for jet aircraft full-power test areas. It is recommended that simulated field tests be conducted on small concrete slabs and beams before a concrete is designated for areas which will be subjected to severe jet-engine exhaust conditions. (Author)

Naval Ordnance Test Station, China Lake, Calif.
ROCKET SLED TEST OF THE NA 39 SEAT-EJECTION SYSTEM, by Bill Moore. 1 July 60, 184p. NOTS TP 2536; NAVWEPS rept. 7566.
Order from LC mi$8.40, ph$28.80 PB 153 404

The purpose of these tests was to make a functional checkout of the NA 39 escape system using Martin-Baker seats, and to determine if the escape system is adequate for safe recovery within the airplane performance envelope. These tests proved that with minor modifications, the NA 39 escape system is capable of safe recovery within its performance envelope. (Author)

Ohio State U. Research Foundation, Columbus.
EVALUATION OF BRAZED HONEYCOMB STRUCTURES, by Robert C. McMaster, Anthony T. D'Annessa and Henry W. Babel. Rept. for Jan 59-May 60 on The Chemistry and Physics of Materials, Contract AF 33(616)6364. Sep 60, 321p. 53 refs. WADD Technical rept. 60-393.
Order from OTS $5.00 PB 171 408

A study was made of commercially-available nondestructive test methods for the evaluation of brazed honeycomb structures. Surface-layer discontinuities in bonding were detected reliably by X-ray, ultrasonic, and thermal gradient tests. Internal discontinuities were detectable only with penetrating radiation tests. X-ray test methods evaluated included: film radiography, xeroradiography, direct fluoroscope, television fluoroscopic systems, electrostatic and photoconductive-screen X-ray image amplifiers. Ultrasonic test methods studied included: Immersion ultrasonic tests with focussed transducers, contact ultrasonic tests with resonance transducers, and contact ultrasonic tests with pulse-reflection systems. Thermal test methods evaluated included: thermal-flash proof tests, tests with heat-repelled fluid coatings, tests with thermographic phosphor coatings, test with color-changing paint coatings, and tests with remote infrared sensing systems. Results of destructive tests on honeycomb parts confirm indications of bond conditions of X-ray, ultrasonic, and thermal tests. Further research and development are recommended for xeroradiography, photoconductive-screen television systems, and thermal-gradient tests. (Author)

Princeton U., N. J.
A REVIEW OF THE WING-SLIPSTREAM PROBLEM WITH EXPERIMENTS ON A WING SPANNING A CIRCULAR JET, by Frank W. Gobetz. Rept. on Contract Nonr-1858(14). Jan 60, 116p. 11 refs. Aeronautical Engineering rept. no. 489; AD-233 722.
Order from LC mi$6.00, ph$18.30 PB 152 873

An attempt was made to examine and evaluate all previous studies whose purpose was to investigate the increase in lift of a wing immersed in a slipstream. Each of the theoretical analyses is discussed to some extent and the limited available experimental data are compared with the theories. The experiments conducted are described and the data compared with what is considered to be the most promising of the theoretical analyses. The correlation between the present data

and the theory formulated by Rethorst is quite good and indicates that at least some of the trends predicted are correct. The appendix describes the integrating manometer which was designed for and employed in the experimental program. (Author)

Princeton U., N. J.
SYMPOSIUM ON GROUND EFFECT PHENOMENA. A COMPILATION OF THE PAPERS PRESENTED OCTOBER 21-23, 1959. Oct 59, 400p. 107 refs. AD-235 210.
Order from LC mi$11.10, ph$60.60 PB 150 075

Rocketdyne [Canoga Park, Calif.]
SUMMARY REPORT FOR THE DESIGN OF AN ION ROCKET RESEARCH DEVICE, by C. R. Dulgeroff and D. J. Kerrisk. Rept. for 1 Jan 59-29 Feb 60 on Contract AF 33(616)5972. Oct 60, 53p. 3 refs. Rept. R-2241; ARL Technical rept. 60-290.
Order from LC mi$3.60, ph$9.30 PB 152 319

A bell jar vacuum system and a vacuum chamber used for research on high current density ion sources are described. Porous samples of nickel, graphite, tungsten, tantalum, and titanium carbide were tested for ability to produce cesium ions by surface ionization. Nickel and graphite were inadequate because of reactions with cesium vapor. Tungsten, tantalum, and titanium carbide produced positive ions. Tungsten produced current densities up to 12 ma/cm^2, and has ionization efficiency greater than 90 percent. Secondary electron emission studies were made to ensure true current measurements. An analytical study of arc type ion sources was made to determine types best suited for high current density ion beams. (Author)

Sperry Gyroscope Co., Great Neck, N. Y.
GYROTRON DEVELOPMENT (INCLUDING OPERATION AND MAINTENANCE INSTRUCTIONS ON XG5 EXPERIMENTAL MODEL). Final engineering rept. on phase 1, Contract NOa(s) 8846. Apr 49, declassified. 94p. 1 ref. Sperry rept. 5226-1129.
Order from LC mi$5.40, ph$15.30 PB 154 298

This report released for sale to the public 10 Feb 61.

This report describes a new type of gyroscopic instrument - the Gyrotron. It gives the principle of operation as well as a detailed mechanical description of the instrument and a circuit description of its associated amplifiers. Preliminary test results are listed and various avenues for future research are discussed. Since the instrument is so radically different from other gyroscopic instruments, chapters are also included on its installation, operation, and maintenance. In two appendices, the discussion of some of the considerations and problems concerned with the Gyrotron is supplemented by mathematical analyses and a description of balancing problems.

Vehicle Research Corp., Pasadena, Calif.
DEVELOPMENT OF METHODS FOR PREDICTING V/STOL AIRCRAFT CHARACTERISTICS, by Scott Rethorst, W. W. Royce, and others. Final rept. Phase 1 on Contract Nonr-3099(00). 15 Apr 60, 199p. 10 refs. VRC rept. no. 5; AD-244 736.
Order from LC mi$8.70, ph$30.30 PB 150 742

This study contains analyses which enable a prediction of optimum V/STOL performance characteristics. The results of these analyses have been presented graphically to facilitate evaluation and to enable determination of fruitful areas of development of V/STOL aircraft. The charts produced have been cast in terms of loadings and dimensionless performance parameters so as to broaden their applicability and generality. These charts thus permit the evaluation, relative rating, and estimation of performance trade-offs of V/STOL aircraft configurations. In the course of this study, a unique analysis has been performed which determines the optimum size actuator disc area for forward propulsion. It is shown that this area is relatively small. The analysis also determines the optimum size actuator disc area for hovering. This area is relatively large. The present study has provided a resolution of this conflict through the concept of variable actuator disc area, which varies the propulsive disc area between the near optimum cases for both hovering and forward propulsion. The ratio of these disc areas thus defined has been employed as a significant parameter to illustrate the areas of major potential performance improvement, and as a powerful tool for prediction of the performance characteristics themselves. Analyses of these considerations are presented in detail. The performance of two example VTOL airplanes incorporating variable disc area is included. (Author)

Vought Astronautics Div., Chance Vought Aircraft, Inc., Dallas, Tex.
IMPACT DISPERSION STUDY OF THE 609A VEHICLES ON THE WHITE SANDS MISSILE RANGE, by M. L. Barnett and G. Tarnower. Rept. on Contract AF 29(600)2404. Aug 60, 169p. in 2 v. 6 refs. AST/EOR-13081; AFMDC-TR-60-23; AD-245 443.
Order from LC mi$7.80, ph$25.80 PB 152 716

An investigation was conducted of the feasibility of using 609A vehicles at the White Sands Missile Range. Range safety requires that all stages of any test vehicle impact on the range. Two one-stage, one two-stage, and one three-stage vehicles were studied. As the result of these analyses, the following conclusions have been reached. With the proper selection of a guidance system, all of the vehicles studied can be safely flown at WSMR. Unguided versions of the configurations studied are not compatible with range safety requirements and so cannot be flown at WSMR. The two one-stage vehicles require only a 609A-type programmed attitude system. The two-stage vehicle is marginal with a 609A-type system, but is satisfactory with a radio command or sophisticated inertial system. The three-stage vehicle requires a radio command or a sophisticated inertial system. Use of a simplified programmed attitude system, in conjunction with a radio command system produces an efficient, economical, standardized configuration that can be used all, or in part, as necessary, in all four vehicles studied. (Author)

Civil Engineering

Arctic Aeromedical Lab., Ladd AFB, Alaska.
SOME STRUCTURAL AND THERMAL CHARACTERISTICS OF SNOW SHELTERS, by Robert W. Elsner and William O. Pruitt. [1956] 20p. 16 refs. Technical note AAL-TN-56-11.
Order from LC mi$2.40, ph$3.30 PB 153 517

Snow shelters of various types have been described with a consideration of their adequacy for travel and survival in extreme cold. With full utilization of subnivean microclimates existing in arctic regions shelters can be constructed which provide interior temperatures considerably above that of ambient air without artificial heating. Avoidance of the most extreme conditions of arctic and subarctic climate is thus possible. A simple method is described for constructing snow shelters by artificially compacting loose, unconsolidated snow. Observations on the thermal and structural characteristics of this type of shelter and of dome snowblock shelters are discussed. (Author)

Naval Civil Engineering Lab., Port Hueneme, Calif.
SNOW-COMPACTION EQUIPMENT SNOW DRAGS, by J. B. Camm. Final rept. 20 Oct 60, 37p. 12 refs. Technical rept. R-109; AD-246 003.
Order from OTS $1.00 PB 171 375

Numerous types and sizes of drags were tested and evaluated during the development of the Navy's snow-compaction techniques. As techniques were developed for constructing skiways, roads and runways on shallow and deep snow fields, two types of drags, along with other special equipment, were found necessary to produce good-quality compacted snow. A snow-leveling drag was needed in the preliminary stages of construction to level and compact windrows left by other equipment, to spread and level shallow drift and light snowfall, and to remove slight surface irregularities. A two-element, 925-pound wooden drag with metal cutting edges was developed for this work. This simple drag was effective at speeds up to 500 feet per minute and could perform light leveling on compacted snow areas at a rate of 5.3 acres per hour. The drag was useful also in maintenance of compacted-snow areas and in leveling and spreading new snow and drift around polar camps. Based on 1959 prices, the approximate cost of this drag is $500 per unit. A snow-finishing drag was needed in the final stage of construction to obtain a hard, smooth finish on compacted snow. Such a finish was necessary for successful operation of aircraft, cars, trucks and other wheeled vehicles on the compacted surface. A two-element, 2,830-pound steel drag with cylindrical bottoms was developed for this work. At a speed of 350 feet per minute, this drag could produce a good-quality finish on 5.3 acres of compacted snow in an hour provided the working elements, or skids, were penetrating 1 to 2 inches into the surface. The drag was useful also in compressively compacting and finishing new snowfalls and drift on compacted-snow areas and around polar camps. Based on 1959 prices, the approximate cost of this drag is $1,500 per unit.

Electrical and Electronic Engineering

Aero Geo Astro Corp., Alexandria, Va.
RESEARCH ON SCANNING TECHNIQUES FOR LARGE, FLAT COMMUNICATION ANTENNA ARRAYS. Final rept. on Contract AF 19(604)5217. 31 Oct 60, 72p. 15 refs. AFCRL-TR-60-364.
Order from LC mi$4.50, ph$12.30 PB 153 712

The program included both theoretical and experimental projects intended to resolve problems associated with scanning in two principal planes. The basic antenna was a large, flat array capable of being used in the VHF or UHF region. The program stressed the use of scanning of two-wire transmission line systems because of their inherent low cost. Scanning in one principal plane was concentrated on techniques associated with two-wire transmission line, while a number of approaches were considered for scanning in the other plane. A rotating cam scanner, described in some detail in this report, was developed for the scanning of the two-wire transmission line, while two approaches appeared satisfactory for scanning in the other principle plane. The two approaches considered were the use of Fox-type phase shifters, that is, rotating phase shifters involving circular polarization within a transmission-line structure, and a multiple-beam technique, in which step scanning is achieved by switching from one beam to its neighbor. A detailed examination of a novel multiple-beam technique is offered; this is basically a problem of examining the characteristics of the transmission-line network feeding the array. It is concluded that a satisfactory low-cost scanning system could be obtained using the rotating cam scanner for one principal plane and either of the other two techniques for the remaining plane. (Author) (See also PB 149 059)

American Electronic Labs., Inc., Philadelphia, Pa.
DESIGN AND DEVELOPMENT OF CRYSTAL VIDEO DETECTOR HOLDERS, by Bernard Haimowitz. Final rept. for 1 May 57-31 July 58 on Contract DA 36-039-sc-73259. [1958] 38p.
Order from LC mi$3.00, ph$6.30 PB 153 227

The basic mathematics for the crystal is presented. The reasons for using bias are discussed. The method of design for the detector mount is presented. Tangential sensitivity data is shown for the five final detector mounts. Drawings showing outline dimensions and weights for these mounts are given. The selection of crystals for these mounts is discussed. (Author)

American Inst. for Research, Pittsburgh, Pa.
TEST MEASUREMENT REQUIREMENTS FOR 1960-62 GROUND ELECTRONIC EQUIPMENT. PHASE I. THE NEED FOR NEW TYPES OF TEST DEVICES, by Alan D. Swain. Rept. on Contract AF 30(602)1654. Mar 58, 71p. 11 refs. AIR-244-58-FR-177; RADC-TR-58-22; AD-148 606.
Order from LC mi$4.50, ph$12.30 PB 150 703

A review of prime and test ground electronic equipment currently being developed for use in the early 1960's reveals that most present test measurement practices

will be continued. A study of data on the use of test equipment by Air Force Specialty Classification 3- and 5-level maintenance mechanics at maintenance sites of the Airways and Air Communications Service shows many liabilities in present test equipment. Unless some substantial changes are made in current plans for early 1960 test equipment, these liabilities will probably continue. The following current difficulties are anticipated. Test devices have limitations in operability. Test devices frequently present information that is not immediately compatible with the maintenance action required. There is also ample evidence of low transferability of skill in the operation of different test sets at a site, even though the sets may perform the same maintenance function. There is also suggestive evidence that one of the reasons that the 5-level mechanic does little fault location is because of the complexities in using present test equipment for that purpose. The following criteria were proposed for the solution of the test measurement problem: (1) All test measurement requirements expected in 1960-62 will be accounted for. (2) There will be the smallest total number of different kinds of test equipment. (3) Items of test equipment will have functional adapability permitting the maintenance mechanic to perform with it those operations that normally are done together. (4) Test equipment "shells" will be human engineered for optimal operability. (5) Information presented by the test equipment will be compatible with the way the maintenance mechanic will have to use the information. (Author)

Antenna Lab., Calif. Inst. of Tech., Pasadena.
RADIATION FROM AN ELECTRIC DIPOLE IN AN ANISOTROPIC COLD PLASMA, by Hans H. Kuehl. Technical rept. no. 24 on Contract AF 18(600)1113. Oct 60, 57p. 13 refs. AFOSR-TN-60-1169; AD-246 496.
Order from LC mi$3.60, ph$9.30 PB 153 224

The general expression for the far-zone dyadic Green's function in an anisotropic medium is presented. The radiation of an electric dipole in a cold plasma in considered. Expressions for the far-zone radiation from a dipole for the case of weak magnetic field and low plasma density are derived. Expressions are also obtained for the case of an infinite magnetic field. (Author)

Army Signal Research and Development Lab., Fort Monmouth, N. J.
CASCODE DISTRIBUTED AMPLIFIER, by Clement A Skalski. 1 May 59, 34p. 3 refs. USASRDL Technical rept. 2043; AD-217 545.
Order from LC mi$3.00, ph$6.30 PB 150 704

The use of triodes in cascode permits extremely wideband amplification. A cascode amplifier, which employs 2C39A triodes as the active element, was constructed and tested. Once the performance of this type of active element is ascertained, the method of employing the active element in a practical distributed amplifier can be determined. A general procedure for synthesizing constant resistance grid lines for distributed amplifiers employing cascode or pentode active elements is presented. (Author)

Army Signal Research and Development Lab., Fort Monmouth, N. J.
COMPACT, HIGH POWER, COAXIAL DIRECTIONAL COUPLER, by Robert D. Standley. 8 May 59, 15p. 2 refs. USASRDL Technical rept. 2041; AD-218 970.
Order from LC mi$2.40, ph$3.30 PB 152 998

The directional coupler covered by this report was designed to be used as a power monitoring device with Radio Relay Set AN/MRC-71. A compact and rugged component was developed by coupling a coaxial line to a strip transmission line. The coupling was approximately 62.5 db and the directivity exceeded 16 db over the required frequency range. Design procedures are outlined. (Author)

Army Signal Research and Development Lab., Fort Monmouth, N. J.
A NEW SEMICONDUCTOR MICROWAVE MODULATOR, by H. Jacobs, F. A. Brand and others. 16 May 60, 28p. 9 refs. USASRDL Technical rept. 2114; AD-244 549.
Order from LC mi$2.70, ph$4.80 PB 153 001

Experiments have been conducted in which a semiconductor rod of germanium is inserted in a waveguide parallel to the direction of the electric field. Upon exposure to light or the injection of minority current carriers by means of a p-n junction, the conductivity of the semiconductor is changed. The changes in conductivity, in turn, cause variations in the absorption of microwave energy. This effect has been designed into a device that offers the possibility of microwave amplitude modulation. Experiments conducted at 9600 megacycles indicate little or no phase and frequency modulation. Performance data and design information relating to the role of the semiconductor lifetime, the effects of various types of trapping centers, and other electrical properties are described. (Author)

Army Signal Research and Development Lab., Fort Monmouth, N. J.
PULSE SYSTEM THEORY APPLICATIONS II, by Kurt Ikrath. 1 Mar 60, 73p. 2 refs. USASRDL Technical rept. 2099; AD-246 075.
Order from LC mi$4.50, ph$12.30 PB 153 000

The wave shapes of pulse train responses of various filter networks under different operating conditions are accurately formulated on the basis of mathematical methods which are documented in USASEL Technical Memorandum M- 1922 of Oct. 1957 entitled Pulse System Theory. A quantitative insight into the shortcomings of ordinary Laplace Transform and Fourier Transform approach to pulse systems problems is given on the basis of numerical examples whose practical implications are discussed. (Author)

Army Signal Research and Development Lab., Fort Monmouth, N. J
THE USE OF A NONLINEAR DEVICE IN THE FEEDBACK LOOP OF AN EXPONENTIAL DELTA MODULATOR, by H. Wolf. 25 July 60, 14p. 2 refs. USASRDL Technical rept. 2141; AD-245 853.
Order from LC mi$2.40, ph$3.30 PB 153 004

Some experiments with exponential delta modulation circuitry are discussed. The results of the experiments show that the quality of ordinary exponential delta modulation for speech can be improved by the application of a nonlinear device in the feedback loop. (Author)

Ballistic Research Labs., Aberdeen Proving Ground, Md.
THE DYNAMIC CHARACTERISTICS OF PHASE-LOCK RECEIVERS, by Keats A. Pullen, Jr. Jan 60, 74p. 34 refs. ARPA Satellite Fence Series no. 8 in the series; Rept. no. 1093; AD-235 010.
Order from LC mi$4.50, ph$12.30 PB 150 066

The characteristics required of a phase-lock tracking receiver under adverse reception conditions are analyzed. It is shown that for constant sensitivity of the phase-lock circuits, the use of a cross-correlation-type AVC circuit is essential. It is also shown that either the use of extensive degeneration in the IF circuits or the use of common channels is essential for minimizing phase errors. The transfer characteristic required for optimum tracking characteristics is derived, and a possible method of obtaining it described. Several recommendations on effective utilization are made, and several problems requiring further study are outlined. (Author)

Ballistic Research Labs., Aberdeen Proving Ground, Md.
PARAMETRIC PRE-AMPLIFIER RESULTS, by K. H. Patterson. Rept. no. 19 on ARPA Satellite Fence Series. Oct 60, 7p. BRL Technical note no. 1354. AD-247 550
Order from LC mi$1.80, ph$1.80 PB 153 494

The DOPLOC system is a special type of CW radar operating at 108 mc. Developed specifically for the quick detection of passive satellites it can, with one transmitter and one receiver, establish orbital parameters immediately after a single pass. To achieve maximum range unusually sensitive receiving equipment is necessary. This requirement places considerable emphasis on the noise-performance of the DOPLOC receivers. Parametric pre-amplifiers, with exceptional noise figures, have been checked, both in the laboratory and in the field. A resume of the experience gained from these tests is presented. (Author)

Boeing Airplane Co., Seattle, Wash.
HEAT PROTECTIVE ABLATIVE COATINGS FOR RADOMES, by J. F. Cavanaugh and J. P. Sterry. Rept. for July 59-May 60 on Thermionic and Solid State Electronic Technology, Contract AF 33(616)6683. Aug 60, 85p. WADD Technical rept. 60-507.
Order from OTS $2.25 PB 171 416

An analysis was made of the thermally induced stresses in a bare and coated alumina radome. The study indicated that it would be structurally feasible to protect a radome on an advanced interceptor against thermal shock by using an ablative covering. Materials were tested to determine the effect of material thermal conductivity upon heat input rate to a ceramic radome. An alumina radome was coated with a silicon carbide filled phenol silane impregnated graphite cloth and tested in a ramjet exhaust. (Author)

Bolt, Beranek and Newman, Inc., Cambridge, Mass.
EQUIVALENT NETWORKS, by Richard D. Thornton. Scientific rept. no. 2 on Contract AF 19(604)7290. 23 Nov 60, 24p. Rept. no. 780; AFCRL-TN-60-1115; AD-246 510.
Order from LC mi$2.70, ph$4.80 PB 153 175

The question under consideration is how to find a simplest electrical network equivalent to a desired network. Four approaches are discussed: State-of-the-art, exhaustive search, important special cases, and considerations of network constraints. (Author)

Bureau of Naval Weapons, Washington, D. C.
A. F. SIGNAL GENERATOR SG-21/U AND SG-21A/U. BuWeps-BuShips Calibration Program. 12 Aug 60, 12p. Secondary Standards Lab. Instrument Calibration Procedure AG-51.
Order from OTS $0.50 PB 171 243

The Test Instrument is a precision audio frequency signal source which delivers signals of any of 26 fixed frequencies between 10 and 500 cps. The frequencies are generated by a rotating disc-photocell arrangement driven by a tuning fork stabilized oscillator.

Bureau of Naval Weapons, Washington, D. C.
AUDIO FREQUENCY IMPEDANCE MEASURING EQUIPMENT OJ-1, OJ-2, OJ-3 AND GENERAL RADIO 650A. BuWeps-BuShips Calibration Program. 25 July 60, 33p. Secondary Standards Lab. Instrument Calibration Procedure AZ-09.
Order from OTS $1.00 PB 171 245

Bureau of Naval Weapons, Washington, D. C.
CAPACITORS, FIXED: GENERAL RADIO 505 SERIES. BuWeps-BuShips Calibration Program. 14 Sep 60, 23p. Secondary Standards Lab. Instrument Calibration Procedure AC-05 (Revision 1), Supersedes ICP 1252, 23 Jan 59.
Order from OTS $0.75 PB 171 239

This procedure describes the calibration of General Radio fixed capacitors, 505 series. The basic calibration method utilized in this procedure is the comparison of the Test Instrument to the precision capacitor or the standard decade capacitor, which has been previously certified to known values.

Bureau of Naval Weapons, Washington, D. C.
GENERATOR, TIME MARK, TEKTRONIX 180A. BuWeps-BuShips Calibration Program. 18 Aug 60, 18p. Secondary Standards Lab. Instrument Calibration Procedure AG-47.
Order from OTS $0.50 PB 171 241

This procedure describes the calibration of the Tektronix 180A Time Mark Generator. The Test Instrument

consists of a precision 1 mc crystal oscillator, plus frequency dividing and multiplying systems. The frequency dividing system produces marker pulses with various spacings, which may be selected separately or superimposed to form a timing comb, as well as accurate trigger pulses which may be used to synchronize oscilloscope displays. The multiplying system provides fixed-frequency sine wave output signals.

Bureau of Naval Weapons, Washington, D. C.
HETERODYNE FREQUENCY METERS 125 KC TO 20,000 KC. BuWeps-BuShips Calibration Program. 17 Aug 60, 17p. Secondary Standards Lab. Instrument Calibration Procedure AF-21.
Order from OTS $0.50 PB 171 240

This procedure describes the calibration of a related group of heterodyne frequency meters, a partial list of which is given below.

Nomenclature	Models
BC-221	-A, B, C, D, E, F, J, K, L, M, N, O. P, or Q
SCR-211	-C, D, F, J, K, L, M, N, O, P, R, T, AA, AC, AF, AG, AH, AJ, or AL

TS-164/AR (identical to SCR-211-AC)

Bureau of Naval Weapons, Washington, D. C.
MICROWAVE ATTENUATION, H-BAND (7.05 TO 10.00 KMC) 0 TO 50 DB. BuWeps-BuShips Calibration Program. 28 June 60, 24p. 1 ref. Secondary Standards Lab. Measurement System Operation Procedure HA-07.
Order from OTS $0.75 PB 171 228

This procedure describes the operation of a secondary standards laboratory calibration system which is used to calibrate H-band microwave attenuators of waveguide size 5/8" x 1-1/4" (outside dimensions). Frequencies of 7.05, 9.0, and 10.0 KMc are used for calibration in this procedure. If other calibration frequencies are required, substitute as applicable. This system utilizes the audio substitution method for attenuator calibration in which audio attenuation is substituted for RF attenuation. A constant audio output is maintained with the Test Instrument first removed and then inserted into the microwave line.

Bureau of Naval Weapons, Washington, D. C.
MICROWAVE ATTENUATION, J-BAND (5.85 TO 8.20 KMCPS) 0 TO 40 DB. BuWeps-BuShips Calibration Program. 18 Dec 59, 23p. Secondary Standards Lab. Measurement System Operation Procedure HA-03.
Order from OTS $0.75 PB 171 225

This procedure describes the operation of a secondary standards laboratory calibration system which is used to calibrate J-band microwave attenuators of waveguide size 3/4" x 1 1/2" (outer dimensions). This system utilizes the RF substitution method for attenuator calibration in which a Standard Attenuator is adjusted to maintain a constant RF output level with the Test Instrument first removed and then inserted into the microwave line.

Bureau of Naval Weapons, Washington, D. C.
MICROWAVE ATTENUATION, S-BAND (2.60 TO 3.95 KMCPS) 0 TO 40 DB. BuWeps-BuShips Calibration Program. 25 Feb 60, 35p. Secondary Standards Lab. Measurement System Operation Procedure HA-05.
Order from OTS $0.75 PB 171 226

This procedure describes the operation of a secondary standards laboratory calibration system which is used to calibrate S-band microwave attenuators of waveguide size 1 1/2" x 3" (outside dimensions). This system utilizes the RF substitution method for attenuator calibration in which a Standard Attenuator is adjusted to maintain a constant RF output level with the Test Instrument first removed and then inserted into the microwave line.

Bureau of Naval Weapons, Washington, D. C.
MICROWAVE ATTENUATION, X-BAND (8.2 TO 12.4 KMCPS) 0 TO 50 DB. BuWeps-BuShips Calibration Program. 18 Dec 59, 23p. Secondary Standards Lab. Measurement System Operation Procedure HA-01; Supersedes MSOP 1851, 29 Aug 58.
Order from OTS $0.75 PB 171 224

This procedure describes the operation of a secondary standards laboratory calibration system which is used to calibrate X-band microwave attenuators of waveguide size 1/2" X 1" (outside dimensions). This system utilizes the RF substitution method for attenuator calibration in which a Standard Attenuator is adjusted to maintain a constant RF output level with the Test Instrument first removed and then inserted into the microwave line.

Bureau of Naval Weapons, Washington, D. C.
MICROWAVE ATTENUATION, X-BAND (8.20 TO 12.40 KMC) 0 TO 50 DB. BuWeps-BuShips Calibration Program. 24 June 60, 25p. 1 ref. Secondary Standards Lab. Measurement System Operation Procedure HA-06.
Order from OTS $0.75 PB 171 227

This procedure describes the operation of a secondary standards laboratory calibration system which is used to calibrate X-band microwave attenuators of waveguide size 1/2" x 1" (outside dimensions). Frequencies of 8.2, 9.0, and 10.0 KMc are used for calibration in this procedure. If other calibration frequencies are required, substitute as applicable. This system utilizes the audio substitution method for attenuator calibration in which audio attenuation is substituted for RF attenuation to maintain a constant audio output with the Test Instrument first removed and then inserted into the microwave line.

Bureau of Naval Weapons, Washington, D. C.
MICROWAVE FREQUENCY, G-BAND (3.95 TO 5.85 KMCPS) ±0.0002% 1" x 2" WAVEGUIDE SIZE. BuWeps BuShips Calibration Program. 18 Dec 59, 25p. Secondary Standards Lab. Measurement System Operation Procedure HF-06.
Order from OTS $0.75 PB 171 231

This procedure describes the operation of a secondary standards laboratory calibration system which is used

to calibrate G-band microwave frequency meters of waveguide size 1" x 2" (outside dimensions). This procedure normally applies to the calibration of Test Instruments with accuracies better than 0.04%.

Bureau of Naval Weapons, Washington, D. C. MICROWAVE FREQUENCY, G-BAND (3.95 TO 5.85 KMCPS) 1" X 2" WAVEGUIDE SIZE. BuWeps-BuShips Calibration Program. 3 Sep 59, 19p. Secondary Standards Lab. Measurement System Operation Procedure HF-04.
Order from OTS $0.50 PB 171 229

This procedure describes the operation of a secondary standards laboratory calibration system which is used to calibrate G-band microwave frequency meters of waveguide size 1" x 2" (outside dimensions). This procedure normally applies to the calibration of G-band frequency meters of accuracies not better than 0.04%.

Bureau of Naval Weapons, Washington, D. C. MICROWAVE FREQUENCY, J-BAND (5.85 TO 8.20 KMCPS) ± 0.0002% 1 1/2" x 3/4" WAVEGUIDE SIZE. BuWeps-BuShips Calibration Program. 18 Dec 59, 26p. Secondary Standards Lab. Measurement System Operation Procedure HF-05.
Order from OTS $0.75 PB 171 230

This procedure describes the operation of a secondary standards laboratory calibration system which is used to calibrate J-band microwave frequency meters of waveguide size 1 1/2" x 3/4" (outside dimensions). This procedure normally applies to the calibration of Test Instruments with accuracies better than 0.04%.

Bureau of Naval Weapons, Washington, D. C. MICROWAVE FREQUENCY, S-BAND (2.60 TO 3.95 KMCPS) ±0.0002% 1 1/2" x 3" WAVEGUIDE SIZE. BuWeps-BuShips Calibration Program. 7 Mar 60, 22p. Secondary Standards Lab. Measurement System Operation Procedure HF-07.
Order from OTS $0.75 PB 171 232

This procedure describes the operation of a secondary standards laboratory calibration system which is used to calibrate S-band microwave frequency meters of waveguide size 1 1/2" x 3" (outside dimensions). With the system described herein, the Test Instrument is calibrated by visually comparing its resonant frequency with a known harmonic of a stable oscillator on a dual-trace Oscilloscope.

Bureau of Naval Weapons, Washington, D. C. R. F. SIGNAL GENERATOR SET AN/URM-26 OR AN/URM-26B. BuWeps-BuShips Calibration Program. 6 July 60, 32p. Secondary Standards Lab. Instrument Calibration Procedure GG-06.
Order from OTS $1.00 PB 171 246

Bureau of Naval Weapons, Washington, D. C. SIGNAL GENERATOR AN/GPM-15. BuWeps-BuShips Calibration Program. 12 Aug 60, 21p. Secondary Standards Lab. Instrument Calibration Procedure AG-52.
Order from OTS $0.75 PB 171 244

This procedure describes the calibration of the AN/GPM-15 Signal Generator Test Set which consists of the SG34/GPM-15 Signal Generator, transit case, and accessory cables. The only item normally requiring calibration is the SG34/GPM-15 Signal Generator.

Bureau of Naval Weapons, Washington, D. C. TEST OSCILLATOR SET AN/PRM-10. BuWeps-BuShips Calibration Program. 8 Aug 60, 21p. Secondary Standards Lab. Instrument Calibration Procedure AF-48.
Order from OTS $0.75 PB 171 242

Bureau of Naval Weapons, Washington, D. C. VOLTAGE STANDING WAVE RATIO, J-BAND (5.85 TO 8.20 KMCPS) 1.00:1 TO 10:1. BuWeps-BuShips Calibration Program. 18 Dec 59, 17p. Secondary Standards Lab. Measurement System Operation Procedure HV-02.
Order from OTS $0.50 PB 171 233

This procedure describes the operation of a secondary standards laboratory calibration system which is used to measure the voltage standing wave ratio of J-band instruments of 3/4" x 1 1/2" waveguide size (outside dimensions). This procedure utilizes the slotted line technique for the measurement of voltage standing wave ratio.

Bureau of Naval Weapons, Washington, D. C. VOLTAGE STANDING WAVE RATIO, S-BAND (2.60 TO 3.95 KMC) 1.00:1 TO 10:1. BuWeps-BuShips Calibration Program. 25 Feb 60, 16p. Secondary Standards Lab. Measurement System Operation Procedure HV-04.
Order from OTS $0.50 PB 171 234

This procedure describes the operation of a secondary standards laboratory calibration system which is used to measure the voltage standing wave ratio of S-band instruments of 1 1/2" x 3" waveguide size (outside dimensions). This procedure utilizes the slotted line technique for the measurement of voltage standing wave ratio. The Klystron and associated cavity used herein covers the frequency range from 2.4 to 3.60 KMc. If suitable signal sources become available, the frequency range can be extended to 3.95 KMc.

Bureau of Naval Weapons, Washington, D. C. VOLTAGE STANDING WAVE RATIO 3/8" COAXIAL, TYPE N CONNECTOR (100 TO 1000 MC). BuWeps-BuShips Calibration Program. 22 Aug 60, 18p. Secondary Standards Lab. Measurement System Operation Procedure HV-06.
Order from OTS $0.50 PB 171 235

This procedure describes the operation of a secondary standards laboratory calibration system which is used to measure the voltage standing wave ratio of 3/8 inch coaxial instruments having type N connectors, and in the frequency range from 100 Mc to 1000 Mc. Single-ended instruments such as signal generators and terminations or double-ended instruments such as attenuators, directional couplers, or filters having a VSWR up to 10:1 can be calibrated with this system. This

procedure utilizes the PRD type 219 standing wave detector in conjunction with a square-wave modulated RF signal source, standing wave indicator, and associated components for measuring voltage standing wave ratio.

California U., Berkeley.
ELECTRON PHYSICS OF TRAVELING WAVE TUBE DEVICES, by J. R. Whinnery, D. H. Sloan and others. Rept. on Research on Physical Phenomena Affecting the Characteristics of Electronic Components, Contract AF 33(616)6139. July 60, 55p. 10 refs. WADD Technical rept. 60-471; AD-246 513.
Order from OTS $1.50 PB 171 414

The work described includes theoretical and experimental studies on cold-cathode crossed-field devices, electron beams, fast-wave interaction with electron streams, solid-state and electron-beam parametric amplifiers, backward-wave interaction with waves on a ferrite rod or in plasmas, large-signal effects in traveling-wave tubes, and novel fast space-charge wave devices. (Author)

California U., Los Angeles.
EXTENSIONS IN THE SYNTHESIS OF THE OPTIMAL OR "BANG-BANG" NONLINEAR CONTROL SYSTEMS. PART II: SYNTHESIS AND ANALYTIC STUDIES OF OPTIMUM TYPE II NONLINEAR CONTROL SYSTEMS, by P. Chandaket and C. T. Leondes. Rept. on Contract AF 49(638)438. June 60, 62p. Dept. of Engineering rept. no. 60-46; AFOSR-TN-60-960; AD-247 424.
Order from LC mi$3.90, ph$10.80 PB 153 438

Most of the work carried out thus far on the synthesis of optimum nonlinear control systems of the "bang-bang" or relay type has concentrated in the main on systems wherein the controller is of the stationary type. In this type of system, the controller depends neither on the input nor on time. This report develops synthesis techniques for optimum nonlinear control systems of the quasi-stationary class wherein the controller configuration depends on a knowledge of certain information about the input to the system. In this way, the class of inputs for which system response is optimum is significantly extended. (Author)

Case Inst. of Tech., Cleveland, Ohio.
ELECTRIC ANISOTROPIC PROPERTIES OF THE METALLIC-STRIP-TYPE PERIODIC MEDIUM, by Nicholas J. Kolettis. Scientific rept. no. 17 on Contract AF 19(604)3887. 30 Oct 60, 90p. 12 refs. AFCRL-TN-60-1127; AD-247 425.
Order from LC mi$4.80, ph$13.80 PB 153 417

The unbounded metallic strip type artificial dielectric, as an isotropic medium, is reviewed and its electric anisotropic character pointed out. The analysis utilizes two approaches: First, the medium is analyzed in terms of modes that propagate normal to the face of the strips. In the second approach, a formulation in terms of modes that propagate parallel with the face of the strips is employed. An analogy between the problems for the three dimensional unbounded strip medium and a rectangular waveguide loaded with the medium is drawn. A computational program in conjunction with an experimental one with typical strip medium samples was undertaken. Theoretical and experimental results obtained for phase constants and equivalent relative permittivities justify the theoretical solutions that were derived.

David Sarnoff Research Center, Princeton, N. J.
PERFORMANCE AND OPERATION OF THE IMAGE ISOCON CAMERA TUBE, by A. D. Cope and H. Borkan. Rept. for Apr 59-Aug 60 on Research on the Quantum Nature of Light, Contract AT 33(616)6497, continuation of Contract AF 33(616)5728. Apr 60, 27p. 3 refs. WADD Technical note 60-123.
Order form OTS $0.75 PB 171 386

The Image Isocon is a television camera tube which maintains a high signal modulation in the presence of excess scanning beam current. This results in a higher signal-to-noise ratio and accommodation of a greater dynamic range of light levels in a scene than can be achieved with tubes employing orthicon scan. The price paid for these improvements is a tube which requires more complex electron optics and procedures of adjustment than the image orthicon tube. Once adjusted the performance remains stable. Included in this report are typical operating potentials and the camera requirements for operation of experimental Isocon tubes being developed under this and a related contract. (Author)

Daystrom Instrument, Archbald, Pa.
MODIFIED R-F SWITCH QRC-29 (T), by John Quinn. Final engineering rept. on Contract AF 30(602)1673. 8 Jan 59, 17p. RADC TR-59-15; AD-210 118.
Order from LC mi$2.40, ph$3.30 PB 150 698

The work was directed toward the development of an experimental modified model of the Radio Frequency Switch for a Wullenweber Antenna. The principal modifications to the original design were concentrated in an effort to improve the overall frequency response of the system, and to that extent, the major redesign was centered around the transformer and rotary choke joint sections.

Diamond Ordnance Fuze Labs., Washington, D. C.
THEORY OF TEM DIODE SWITCHING, by Robert V. Garver. 20 Oct 60, 56p. 13 refs. TR-874.
Order from LC mi$3.60, ph$9.30 PB 153 579

The theory and technique for the design of a broadband (100-to-1 frequency range) TEM microwave diode switch are presented. A coaxial transmission line switch has been constructed that provides 26-db or greater isolation and insertion loss ranging from 1.6 db to less than 1 db from 40 Mc to 4000 Mc. An analysis is given of the switching action of one and of two or more diodes as well as the biasing of the center conductor of a TEM transmission line over broad frequency bandwidths without interacting with the rf signal. The use of point-contact germanium, varactor, and gold-bonded germanium diodes for TEM switching is discussed. Some considerations of switching speed and maximum power-handling capacity are given. (Author)

Eagle-Picher Co., Joplin, Mo.
THE DESIGN AND DEVELOPMENT OF A HIGH ALTITUDE RADIOSONDE BATTERY, BA-347(XE-2)/U, by George O. Archer and Edward P. Broglio. Final rept. for 28 May 59-1 June 60 on Contract DA 36-039-sc-78327. [1960] 67p. AD-242 555.
Order from LC mi$3.90, ph$10.80 PB 153 231

The BA-347(XE-2)/U has been successfully designed to operate at 130,000 foot altitudes. A pressure tight plastic case was designed and tested. Problem areas, involved positioning the vent part to prevent freezing and the selection of a suitable vent valve to operate in conjunction with the battery case. Included in the report are test data, graphs, charts, and photographs of the battery. Assembly and detail drawings of parts unique to this battery are also appended. (Author)

Electronics Research Lab., Northeastern U., Boston, Mass.
CAPACITY OF 2-2, 2-3 AND 3-3 CHANNELS, by Sze-Hou Chang and Eric Reid. Scientific rept. no. 4 on Contract AF 19(604)3053. 27 Sep 60, 77p. 11 refs. AFCRL-TN-60-1102.
Order from LC mi$4.50, ph$12.30 PB 153 722

The algebraic method of Muroga and the geometrical method of Shannon are used to calculate the capacity of 2-2, 2-3 and 3-3 channels. The geometrical meanings of certain algebraic quantities are explored. In particular the process of channel cascading is considered as a geometrical mapping. The various ways of cascading of 2-2, 2-3, 3-3 and 3-3, 3-2, 2-2 channels are then discussed together with the decomposition of 2-3 and 3-2 channels. The probabilities of input symbols to realize the theoretical capacity of a 3-3 channel are not always positive. In case negative probability appears, one input symbol must be suppressed to realize the actual capacity of the channel. The condition under which this phenomenon occurs is studied for a special class of 3-3 channels. Finally, the effects on the capacity of a 2-2 channel when the detection threshold is varied and when this channel is provided with a null-zone of detection are considered. (Author)

Electronics Research Lab., U. of California, Berkeley.
NOISE IN BACKWARD-WAVE AMPLIFIERS, by H. Jory. Rept. on Contract AF 49(638)102. 25 July 60, 176p. 49 refs. IER series no. 60, issue no. 298; AFOSR-TN-60-1171; AD-247 353.
Order from LC mi$8.10, ph$27.30 PB 153 400

The backward-wave amplifier, a type of traveling wave tube, is studied from the point of view of the current and velocity fluctuations which are present in the electron beam, and which produce electrical fluctuations or noise in the output of the device. The work is concerned with tubes employing the tape-helix interaction circuits and hollow cylindrical electron beams normally found in backward-wave amplifiers. An analysis is presented which demonstrates that this type of amplifier involves an infinite set of beam waves having one phase variation in angle, but different radial variations. The relative coupling between the helix and the various radially-varying beam waves is determined. The relative excitation of the beam waves is also calculated for typical noise pulses of finite width. An experimental system designed to measure that part of the noise which couples to the backward-wave amplifier is described. Measurements with two types of operating conditions near the cathode are discussed. The measurements of noise power are used to obtain an estimate of the ratio Π/S, where Π is a measure of correlation between current and velocity fluctuations, S is a noisiness parameter, and the minimum noise figure is proportional to $(S-\Pi)$. (Author)

General Electric Co., Owensboro, Ky.
INVESTIGATION OF THE EFFECTS OF ENVIRONMENT AND OF OPERATING CONDITIONS ON THE RELIABILITY AND CHARACTERISTICS OF RELIABLE ELECTRON TUBES. VOLUME I, by W. S. Bowie. Rept. on Study of Electron Tube Life, Contract DA 36-039-sc-42524. [1955] 886p.
Order from LC mi$11.10, ph$134.70 PB 154 484-1

This report released for sale to the public 17 Feb 61.

A study was made of the effects of the environmental factors, mechanical vibration and ambient temperature, and of the operating conditions, heater voltage, heater cycling, plate voltage, plate current, plate dissipation and pulse operation on reliable-type miniature receiving tubes. The effect of these conditions on the survival rate and on the change in the characteristics was studied and the results presented in graphical and mathematical form. The data so presented can be used by designers of electronic equipment to enable them to design for the highest reliability and the most stable operation of the electron tubes. (Author) Included are data and graphs on the effects of heater voltage, ambient temperature, and heater cycling.

General Electric Co., Owensboro, Ky.
[INVESTIGATION OF THE EFFECTS OF ENVIRONMENT AND OF OPERATING CONDITIONS ON THE RELIABILITY AND CHARACTERISTICS OF RELIABLE ELECTRON TUBES. VOLUME II, by W. S. Bowie] Rept. on Study of Electron Tube Life, Contract DA 36-039-sc-42524. [1955] 917p.
Order from LC mi$11.10, ph$139.20 PB 154 484-2

This report released for sale to the public 17 Feb 61.

Included are data and graphs on the effects of plate current, plate voltage and plate dissipation; mechanical excitation; and pulse operation. (See also PB 154 484-1)

General Electronic Labs., Inc., Cambridge, Mass.
SPECIFICATION FOR METHODS OF EVALUATING THE SUSCEPTIBILITY OF FM COMMUNICATIONS RECEIVERS, by D. Beaubien, E. Browne and others. Rept. on Contract DA 36-039-sc-78240. Sep 59, 29p.
Order from LC mi$2.70, ph$4.80 PB 153 241

This document specifies the method of testing frequency-modulation communication receivers for their susceptibility to jamming. This method consists of five standard tests, the results of which permit a good

appraisal of the performance of a receiver under jamming conditions. To facilitate rapid evaluation of the test results, a method of assigning numerical scores to the various test results has been developed and is included in this specification. (Author)

Haloid Xerox, Inc. [Rochester, N. Y.]
RESEARCH ON HIGH TEMPERATURE COMPLEX COMPONENT DEVELOPMENT. Final rept. for 1 Apr 59-31 Aug 60 on Contract AF 19(604)5508. [1960 77p. 19 refs. AFCRL-TR-60-353.
Order from OTS $2.00 PB 171 380

This contract work resulted in the development of a new microminiature concept, the RC circuit plate. This plate is formed by depositing, without masks, conductive, resistive, and dielectric materials on a ceramic substrate. This is converted into an actual RC circuit by applying a xerographic resist pattern and selectively etching the various layers. Associated with the circuit plate is an interconnection scheme that employs printed circuit techniques. This allows circuits to be assembled into modules and modules into "super modules," thereby constructing complex equipment without resorting to soldered wire connections. Paralleling this development of a micro circuit concept was the investigation of new materials for extreme environment operation and new methods of depositing such materials. Results of this work included: (a) development of electron bombardment techniques for the deposition of highly refractory dielectrics, (b) formation of thin film capacitors by anodization and chemical deposition and (c) deposition of conductive films on ceramic substrates by electroless plating. Utilizing several of the above techniques, a large number of chromium resistors and SiO capacitors were fabricated and tested. Information on cycling, thermal shock, and aging are given. Preliminary work on layout and formation of typical computer type circuitry was done. (Author)

Haverford Coll. [Pa.]
ELECTRONIC OBSTACLE AND CURB DETECTORS FOR THE BLIND, by T. A. Benham. Summary rept. for 1 Jan 53-30 June 60 on Subcontract no. 1 to Biophysical Electronics, Inc., Contract V1001M-1900. [1960] 206p. 13 refs. AD-243 621.
Order from LC mi$9.30, ph$31.80 PB 153 101

An obstacle detector has been built and three units field tested by blind people over a period of approximately one year. A portable laboratory model of a curb detector has also been built and briefly field tested. It still requires further development to become a practical device. Both instruments range by optical triangulation using light in the near infra-red and a germanium photodiode light detector. Output to the blind user is from a tactile stimulator mounted in the handle. The obstacle detector, weighing two pounds, is housed in a box, approximately 7" x 7" x 13" including handle. Its maximum detection range is 9' but this can be reduced to 5' by depressing a switch in the handle. It operates for five hours per charge from a rechargeable battery. The curb detector will detect holes, down-curbs over 3", up-curbs over 6" and low obstacles. A chopped incandescent light is focused on the ground by the upper of two plastic Fresnel lenses. The diffuse reflection of this light is imaged by the lower Fresnel lens on a pair of photodiodes mounted side by side on a servo-actuator. As the range changes, due to walking motion, (from 3' to 7') the actuator is positioned to produce equal light signals from both photodiodes. A down-curb casts a shadow causing the light to be lost. An up-curb reduced the range so the system cannot follow, again causing the light to be lost. Light loss is signaled to the user. (Author)

Hughes Research Labs., Malibu, Calif.
STRIP MAPPING BENEATH AIRBORNE RECONNAISSANCE VEHICLE, by D. L. Bullock and O. R. Price. Scientific rept. no. 3508/9 on Contract AF 19(604)3508. May 60, 29p. 5 refs. AFCRL-TN-60-1121.
Order from LC mi$2.70, ph$4.80 PB 153 396

Institute of Mathematical Sciences, New York U., N. Y.
ON ELECTROMAGNETIC EIGENFUNCTIONS IN CLOSED CAVITIES, by H. Niemeyer. Rept. on Contract AF 49(638)229. Aug 60, 46p. 10 refs. Research rept. no. BR-34; AFOSR-TN-60-1103; AD-245 335.
Order from LC mi$3.30, ph$7.80 PB 152 727

Some asymptotic statements about the electromagnetic eigenfunctions in closed cavities are proved. The behavior of the corresponding Green's tensors is investigated and to this result is applied a Tauberian theorem for Laplace transformations which will yield the asymptotic statements. (Author)

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
RBF-3 RECEIVERS, by F. H. Davis. Rept. on Contract W04-200-ORD-455. 26 July 48, 18p. 5 refs. Memo. no. 4-29.
Order from LC mi$2.40, ph$3.30 PB 153 951

This report released for sale to the public 3 Feb 61.

The purpose of this report is to discuss steps taken to improve the operation of the RBF-3 telemetering receivers. Five Navy RBF-3 FM receivers were used as received from the Navy and were modified slightly to receive the JPL telemetering channels. These receivers were well constructed, the parts easily accessible, and the limiting characteristics good. It was decided to attempt to improve their sensitivity and signal-to-noise ratio as much as possible and practicable. The receivers at the present time approach the theoretical maximum for sensitivity and operation. In comparison with their original condition, they are capable of receiving a minimum signal of 4 per cent of the power originally required; or with a transmitter of fixed power and other conditions being equal, the maximum range has been increased five times. (Author)

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
A 217-219mc ADAPTER UNIT FOR USE WITH THE RBF-3 RECEIVER, by Clifford I. Cummings. Rept. on Contract W04-200-ORD-455. 15 Sep 48, 10p. 2 refs. Memo. no. 4-43.
Order from LC mi$1.80, ph$1.80 PB 153 950

This report released for sale to the public 3 Feb 61.

The contemplated change in telemetering frequency to the newly authorized band in the vicinity of 218 mc for use in future rocket firings has required careful consideration of the RF transmission problem. If the power output of the telemetering transmitter is to be kept small, so that the weight of the power supply may be kept to a minimum, a receiver of optimum performance is necessary. Redesign of the RF head from a BC 1267-A IFF component (previous frequency range 157 to 187 mc) has been completed with good results. This unit is cabled into the converter tube socket of an RBF-3 FM receiver, thus using all of the features of this receiver with the exception of the original RF section. The RBF-3 may be used at its original frequency by merely unplugging the adapter unit, replacing the tubes of the RF section, and retuning the first IF transformer primary. With this arrangement, limiting action is obtained with a 5 μv internal voltage of a 50-ohm source, and with a noise figure of about 8 db. (Author)

Laboratory for Insulation Research, Mass. Inst. of Tech., Cambridge.
PRINCIPLES OF MODERN MATERIALS RESEARCH, by A. von Hippel. Rept. on Contracts Nonr-1841(10), AF 30(635)2872 and AT(30-1)1937. Mar 59, 25p. 37 refs. Technical rept. 136.
Order from LC mi$2.70, ph$4.80 PB 150 709

Quest for the "Ideal Capacitor", Technical Breakdown Strength, Breakdown Phenomena in Alkali Halide Crystals, Qualitative Molecular Theory.

Lincoln Lab., Mass. Inst. of Tech., Lexington.
DETECTION OF SIGNALS IN NON-GAUSSIAN NOISE COMPUTATION RESULTS FOR THE LINEAR AND LIMITING DETECTOR SYSTEMS, by James W. McGinn. Rept. on Contract AF 19(604)7400. 7 Oct 60, 27p. 47G-0007; AD-246 779.
Order from LC mi$2.70, ph$4.80 PB 153 217

Some results are presented of the computation of probability functions for the detection of pulse signals in a noise background of time varying power. The results are concerned with the linear and limiting detector systems described previously. Probability functions are given on the reference for the two detector systems of interest and the values of parameters used in computation are specified. The results of computation in the form of graphs of the probability functions are outlined and a brief discussion is given of the results obtained. (Author)

Lincoln Lab., Mass. Inst. of Tech., Lexington.
EXPERIMENTAL AUTOCORRELATION OF BINARY CODES, by D. F. DeLong. Rept. on Contract AF 19(604)7400. 24 Oct 60, 12p. 47G-0006.
Order from LC mi$2.40, ph$3.30 PB 152 974

In order to get good range resolution from a long-pulse radar, it is necessary to increase the bandwidth of the pulse in some manner. One technique, first proposed by Siebert, is to subdivide the pulse into interval 0 or π according to some coding scheme. This report gives the results of an experimental search for phase codes with good autocorrelation functions. Thus the ambiguity function only along the zero doppler axis ($\omega = 0$) is examined.

Lincoln Lab., Mass. Inst. of Tech., Lexington.
PERTURBATION THEORY OF THE RECIPROCAL FERRITE PHASE SHIFTER, by Kenneth J. Button and Benjamin Lax. Rept. on Contract AF 19(604)7400. 1 Dec 60, 15p. 6 refs. 84G-0013. AD-247 290.
Order from LC mi$2.40, ph$3.30 PB 153 421.

A quantitative comparison has been made between the results of the perturbation theory analysis and the experimental observations. It has only been necessary to consider the fundamental mode of propagation in a waveguide containing an equivalent dielectric slab and to use as the perturbation the change in the diagonal component of the ferrite permeability tensor as the ferrite becomes magnetized. An explicit expression for the phase shift has been derived. A simplified form valid for ferrite specimens large enough to be useful in the reciprocal phase shifter reveals the principles of operation. This result shows that dielectric concentration of the microwave fields within the ferrite produces a magnification of the permeability change as the ferrite specimen becomes magnetized in the small applied dc field. (Author)

Lincoln Lab., Mass. Inst. of Tech., Lexington.
SIGNAL PROCESSING IN RADAR ASTRONOMY. COMMUNICATION VIA FLUCTUATING MULTIPATH MEDIA, by R. Price and P. E. Green, Jr. Rept. on Contract AF 19(604)7400. 6 Oct 60, 276p. 71 refs. Technical rept. no. 234; AD-246 782.
Order from LC mi$11.10, ph$42.60 PB 153 225

The detection and measurement of fluctuating targets that have appreciable depth are discussed. Although stated in radar terms, the results are equally applicable to communication problems in which the propagation medium has significant multipath spread and fluctuation rate. A signal received from such a target or channel is a perturbed version of the transmission, in which frequency and time (delay) spreads have been produced by multiple random modulation superimposed by the target (or channel) on the original modulation of the transmission. Special cases of the deep fluctuating target, namely the fluctuating point target and the very slowly fluctuating deep target, are also considered. (Author)

Lincoln Lab., Mass. Inst. of Tech., Lexington.
AN ULTRASONIC RECEIVER FOR DETECTING SIGNALS OF BATS, by A. Bertolini. Rept. on Contract AF 19(604)7400. 1 Dec 60, 38p. 3 refs. 47G-0010.
Order from LC mi$3.00, ph$6.30 PB 153 697

A transistorized ultrasonic receiver for detecting signals of bats has been built. It has a small signal gain of 65 db with a bandwidth from 15 Kc to 200 Kc. Some bandwidth selection within this frequency range can be obtained with the use of plug-in filters built for the purpose. Additional gain of up to 14 db can be obtained, depending on the preamps used. (Author)

Lincoln Lab., Mass. Inst. of Tech., Lexington.
A WIDE BAND ANTENNA, HAVING AXIALLY SYMMETRICAL PATTERNS, HIGH GAIN AND LOW SIDE LOBES FOR ALL POLARIZATIONS, by K. J. Keeping. Rept. on Contract AF 19(604)7400. 30 Nov 60, 33p. 1 ref. 46G-0008.
Order from LC mi$3.00, ph$6.30 PB 153 696

This report describes an antenna with its rear feed which has circular symmetry about the axis of its circular waveguide. It has equal E and H plane beamwidths of 0.5° and the side lobe levels attained on the test antenna were more than 20 db below that of the main lobe. The performance of the antenna is compared with theoretical results based on Huygen's Principle. Due to the complicated nature of the primary pattern, it is difficult to define it accurately. Therefore, a close approximation to the actual patterns was used and close agreement is obtained in the positions and relative magnitudes of the first side lobes. The main lobe, as predicted, is in close agreement with the measured pattern. (Author)

Litton Industries, Salt Lake City, Utah.
COAXIAL GAS DISCHARGE DEVICE, by L. D. Yancey. Quarterly progress rept. no. 1, 19 May-31 July 60, on Contract DA 36-039-sc-85128; continuation of Contract DA 36-039-sc-72403. [1960] 29p. AD-243 269.
Order from LC mi$2.70, ph$4.80 PB 153 245

An analysis of the fired VSWR of the duplexer is presented. The effect of removing the "keep-alive" stub and varying transmitter-to-antenna length is shown. Preliminary redesign of the ATR tube is established. (Author)

Lockheed Aircraft Corp., Sunnyvale, Calif.
DESIGN AND CONSTRUCTION OF LARGE ANTENNAS FOR RADIO ASTRONOMY, RADAR AND COMMUNICATIONS, by George R. Evans. 28 June 60, 33p. 114 refs. SB-60-26; AD-240 310.
Order from LC mi$3.00, ph$6.30 PB 152 719

A bibliography; sources checked were: Applied Science and Technology Index (Industrial Arts Index), 1950-date; ASTIA, through 1 June 1960; California Institute of Technology, Jet Propulsion Laboratory, CIT/JPLAI. Literature Search No. 60: Radio Astronomy; Engineering Index, 1950-date; Science Abstracts, Section B (Electrical Engineering), 1955-date; Technical Information Center, Lockheed Missiles and Space Division.

Lockheed Aircraft Corp., Sunnyvale, Calif.
DIELECTRIC LOADED RESONANT SLOTS, by J. W. Carr. Technical memo. on Physical Electronics. May 60, 37p. LMSD-288264; AD-240 047.
Order from LC mi$3.00, ph$6.30 PB 152 693

Experimentally determined families of curves plotting slot resonant frequency versus (1) slot thickness-to-width ratio and (2) relative dielectric constant of the slot loading material, are presented for half-wave resonant slots. The role that the slot width-to-length ratio plays in determining the slot resonant frequency is demonstrated graphically. An example of how the data may be interpolated for design applications is included and discussed. (Author)

Lockheed Aircraft Corp., Sunnyvale, Calif.
REPORT OF THE JOINT MEETING ON SOLAR CELL MEASUREMENT STANDARDIZATION BY THE WEST COAST SUBCOMMITTEE OF THE AIEE SOLID STATE DEVICES COMMITTEE AND THE SEMICONDUCTOR PHOTODIODE TASK GROUP (28.4.6) OF THE IRE SOLID STATE DEVICES COMMITTEE AT THE STATLER-HILTON HOTEL, LOS ANGELES, CALIFORNIA, 17-18 DECEMBER 1959. 29 Feb 60, 84p. 51 refs. LMSD-288184.
Order from LC mi$4.80, ph$13.80 PB 153 645

Contents:
Solar cell standards and measurements
Laboratory light source and instrumentation
Definitions and terminology
Literature survey.
New items of solar radiation equipment unlisted in Eppley Laboratory, Inc. descriptive bulletins
A precision radiometer for the measurement of total radiation in selected spectral bands
Representative solar radiation data

Mallory, P. R., and Co., Inc., Indianapolis, Ind.
UNIVERSAL POWER SUPPLY (VIBRATOR TYPE), by Ralph Albon, Jr. and Kenneth Smith. Final rept. for 15 May 56-31 Aug 58 on Contract DA 36-039-sc-72370. 31 Aug 58, 54p. 9 refs.
Order from LC mi$3.60, ph$9.30 PB 150 689

This power supply is intended to operate beacons, telemetering units, and other related pieces of equipment. Four different developmental designs were built and tested before a final design was evolved. The latter consisted of an aluminum housing about 3" in diameter and 9" overall length within which was located printed wiring cards to which the components were mounted. Out-put voltages of 6.5, -22.5, 150, and 315 volts, with adjustable controls, where necessary, were available at connectors mounted to one end of the power supply. The battery was sealed from the circuitry section to prevent possible damage from electrolyte leakage. (Author)

Microwave Associates, Inc., Burlington, Mass.
HIGH REPETITION RATE BROADBAND DUPLEXER, by Emanuel L. Horn. Quarterly progress rept. no. 7, 15 Feb-15 May 60, on Contract DA 36-039-sc-78165. [1960] 14p. AD-243 375.
Order from LC mi$2.40, ph$3.30 PB 153 229

The X-700 klystron was received and installed but failed to function after less than 10 hr of operation at or below its rated power output. Recovery time instrumentation was completed prior to the klystron failure. Fabrication techniques were developed for the quartz wafer type encapsulated window with results which appear promising. Redesign of the tuned encapsulated element is progressing with satisfactory initial results. Fabrication of a dual tube with high power encapsulated input windows yielded an increase in bandwidth over that previously obtained. (Author)
(See also PB 152 668)

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
INVESTIGATIONS OF HIGH-POWER MAGNETIC MODULATORS, by E. J. Smith and T. Kusuda. Final rept. on Contract AF 30(602)1619. 22 July 60, 50p. 3 refs. Final rept. R-797-59; PIB-725; RADC-TR-60-228; AD-247 227.
Order from LC mi$3.30, ph$7.80 PB 153 454

The results of investigations of high-power magnetic modulators are summarized; the topics include: improvement of a two-megawatt experimental magnetic modulator, evaluation of polyphase modulators, and studies of the flux-reset mechanism. An electrodeless switch is described and the power capability of electromechanical pulsers with solid conductors is explored analytically. Finally the results of a study of the operating characteristics of a hybrid pulse generator are presented. (Author)

Microwave Lab., Stanford U., Calif.
SOME EXPERIMENTS WITH A NEW TYPE OF CROSSED-FIELD GUN, by T. A. Midford and G. S. Kino. Scientific rept. no. 25 on Contract AF 19(604)1930. Aug 60, 33p. 11 refs. M. L. rept. no. 732; AFCRL-TN-60-1120; AD-247 593.
Order from LC mi$3.00, ph$6.30 PB 153 504

The construction and testing of a crossed-field gun based on an exact space charge flow solution will be described. All the characteristic parameters of a gun of this type may be obtained analytically. Experimentally the gun was found to perform essentially as predicted. This gun has a moderately high convergence and produces a beam whose gross features give a very good approximation to planar Brillouin flow. Work by Anderson has indicated that crossed-field beams produced by a gun of this type may be somewhat less noisy than similar beams produced by other types of guns. (Author)

Motorola, Inc., Chicago, Ill.
LOW FREQUENCY ELECTRO-MECHANICAL FILTER by B. Niederman and Stanley P. Lapin. Quarterly progress rept. no. 7, 1 Nov 53-31 Jan 54, on Contract DA 36-039-sc-15535. [1954] 48p. 5 refs.
Order from LC mi$3.30, ph$7.80 PB 150 692

Theoretical and preliminary experimental results on a low impedance lattice filter, utilizing two crystals per section, are given. Theoretical and experimental investigations on a low impedance ladder filter utilizing one crystal per section are made. Progress on fabrication of low-inductance 455 kc. crystals is described, including CT cut face shear crystals and overtone X-cut crystals. (See also PB 140 567).

National Aviation Facilities Experimental Center, Atlantic City, N. J.
STUDY OF PILOT OPERATIONAL CAPABILITIES IN THE USE OF THE FAA PICTORIAL POSITION INDICATOR AND THE AVION PICTORIAL NAVIGATIONAL DISPLAY IN THE TERMINAL AREA, by R. B. Fisher and J. A. Sunkes. Feb 60, 97p. Task Assignment D-2-5213.
Order from OTS $2.25 PB 171 368

A preliminary investigation and analysis was conducted at NAFEC to determine the ability of a pilot to use a pictorial display of VOR/DME information and to determine associated effects on communication workload. The terminal area was emphasized for this investigation as part of an extensive Bureau of Research and Development program also involving enroute and high altitude utilization of pictorial displays. The investigation and analysis provided information on pilot ability to use pictorial displays for transition from airways to airport instrument landing systems and for airport departures to enroute airways as well as for missed-approach and holding pattern procedures.

National Bureau of Standards, Boulder, Colo.
INVESTIGATION OF STABILITY OF QUARTZ RESONATORS AT LOW TEMPERATURES, by P. A. Simpson and A. H. Morgan. Quarterly progress rept. for 1 Feb-30 Apr 59. 1 June 59, 25p. 2 refs. NBS rept. 6062; AD-219 846L.
Order from LC mi$2.70, ph$4.80 PB 150 064

A continuation of some crystal aging tests at 13°C and 40°K is reported. Long-term measurements over a period of 34 days show no aging to parts in 10^{10} and short-time (second-to-second) stabilities are a few parts in 10^{11}. (Author)

Naval Ordnance Lab., Corona, Calif.
COMPONENTS FOR A LOW-LEVEL PULSE-CODE MODULATION TELEMETRY SYSTEM, by E. R. Hill and J. L. Weblemoe. 11 Jan 60, 56p. 5 refs. NAVWEPS rept. 5974; NOLC rept. 478.
Order from LC mi$3.60, ph$9.30 PB 150 707

Components for low-level commutation and coding of instrumentation data were investigated for use in a pulse-code modulation telemetry system. The investigation resulted in the development of solid-state circuitry that can: (1) commutate and code data from source impedances up to 500 ohms with full-scale signal outputs of 50 mv, and (2) provide an eight-bit straight binary code at a 250-kc clock rate without resorting to amplification ahead of the coder. The system was based on a design philosophy that involves a successive-approximation method of data sampling and coding. The pulse-code generator, which makes up the coding portion of the design, includes a comparator, pulse amplifier, and weighted-voltage generator, with associated circuitry. Electronic-switch and saturable-core ring-counter configurations are used in the commutation circuitry. The circuits described in this report, although specified for a PCM telemetry system, may prove to be useful in many areas of instrumentation. (Author).

Naval Ordnance Test Station, China Lake, Calif.
INSTRUCTIONS FOR OPERATION AND MAINTENANCE OF THE MODULATOR, 4-CHANNEL PCM TIMING SYSTEM, by D. T. Duckworth. 15 Aug 60, 28p. 18 refs. NOTS TP 2519; AD-246 256.
Order from LC mi$2.70, ph$4.80 PB 153 084

The underlying principle of the PCM timing system is pulse transmission of data; precise timing and control functions are derived by digital techniques and

sent to test-range instrument sites via a single-carrier 9-channel or 4-channel pulse-code-modulated UHF radio link. This report, one of a series on the 4-channel system, describes the modulator. The modulator is used in the central station to commutate the four individual intelligence functions into the pulse-coded signal frame that is fed to the UHF radio-link transmitter. (Author)

Naval Ordnance Test Station, China Lake, Calif.
INSTRUCTIONS FOR OPERATION AND MAINTENANCE OF THE NOTS PORTABLE TIMING UNIT (STU-1), by George R. Meuser. 15 Aug 60, 15p. 3 refs. NOTS TP 2531; AD-246 797.
Order from LC mi$2.40, ph$3.30 PB 153 221

The Supplementary Timing Unit, Model STU-1, is a precision, free-running 1000-cycle generator used as an uncorrelated time-base generator with recording cameras located beyond the area serviced by the NOTS range-timing system. The output of the timing unit consists of 1000-cycle pulses with every 10th pulse broadened for aid in assessment. The output is of sufficient amplitude and power to drive as many as three NE-17 neon lamps. (Author)

Naval Research Lab., Washington, D. C.
CRT TARGET DETECTABILITY WITH TRANSPARENT AND OPAQUE PHOSPHORS, by C. W. Iseley and J. M. Carl. Interim rept. 23 Oct 59, 8p. 8 refs. NRL rept. 5413; AD-229 180.
Order from LC mi$1.80, ph$1.80 PB 143 302

Research is presented on cathode-ray tube (CRT) display problems arising from environmental illumination. An investigation was made of the target detectability characteristics of a transparent and an opaque phosphor under moderate illumination conditions. The method of experimentation which was used involved the simulation of a radar B-scope presentation. Independent variables were CRT grid bias (pedestal amplitude), receiver noise, and type of phosphor. Results indicate that for each phosphor least signal strength is required for detection when receiver noise is approximately maximal. With at least moderately high gain, detectability is approximately the same for a wide range of grid biases. There is no significant difference in detectability between the transparent and conventional-phosphor tubes under these optimal conditions. (Author)

Naval Research Lab., Washington, D. C.
WIND-INDUCED TORQUES MEASURED ON A LARGE ANTENNA, by James W. Titus. Interim rept. 27 Dec 60, 49p. 7 refs. NRL rept. 5549.
Order from LC mi$3.30, ph$7.80 PB 150 319

The fluctuating torques applied by wind forces are an important source of error in the servo systems required to aim large antennas for radar and radio astronomy. As a step toward providing design information for estimating and minimizing these errors, direct measurements were made of the wind-induced torque acting about the elevation axis of a 60-ft Kennedy paraboloidal antenna. Torque was measured by a strain-gage bridge and recorded on magnetic tape. Sixty runs, each of 33 minutes duration, were recorded. A mean-squared torque spectral-density curve was obtained for each run. A two-variable function of the form used by Newton and others gives a good fit with these data. The half-power frequency values ranged from 0.029 to 0.29 radian per second, with a median value of 0.11 radian per second. A second corner frequency in the vicinity of 2.0 radians per second was also observed. Peak torques were observed during certain runs, and equivalent aerodynamic moment coefficients were derived. Root-mean-square values of wind-torque variation were obtained for all runs. (Author)

Nobel Inst. of Physics, Stockholm (Sweden).
A NEW SOLUTION OF THE FINITE RISE TIME PROBLEM BY MEANS OF A DISTRIBUTED AMPLIFIER WITH AUTOMATIC GAIN CONTROL, by Bertil Johansson. Technical note no. 1 on Contract AF 61(052)118. 15 Dec 59, 8p. AFOSR TN-60-164; AD-232 064.
Order from LC mi$1.80, ph$1.80 PB 150 720

In a distributed amplifier the output pulse is built up by the addition of pulses from subsequent stages. If this sum up is stopped when the pulses have reached a certain pulse-height level then the output pulses will have the same height and, what is essential in time measurements, the same shape independent of the height of the input pulse within a certain pulse-height range. A distributed amplifier based on this principle is described. It consists of 2 cascaded 5 tubes amplifiers (rise-time 8 ns) and covers a pulse-height range of 15 dB. By conveniently chosen combination of number of tubes and cascaded amplifiers any desired pulse-height range can be covered. The amplifier can be built for fast as well as slow phosphors. (Author)

Office of Scientific Research and Development. Div. 19.
A SYSTEM OF SHORT-RANGE COMMUNICATION BY PASSING AUDIO-FREQUENCY ELECTRIC CURRENTS THROUGH WATER, by Howard C. Hardy (Moore School of Electrical Engineering, U. of Pennsylvania). Final rept. (Part IV) on Contract OEMsr-922. June 45, downgraded 14 Feb 58, declassified 12 Jan 61. 101p. 15 refs.
Order from LC mi$5.70, ep$18.30 PB 153 954

This report released for sale to the public 1 Feb 61

Audio-frequency currents (speech or single tone) are introduced into the water from a suitably design amplifier or oscillator and a transformer connected to two electrodes in the water. When the currents flow through the conducting medium, an alternating emf will be found to exist between two other electrodes placed in the water. The received signal is then amplified and heard in earphones. This kind of communication is called UWT (underwater telegraph or telephone). Papers are included on: general theory of propagation of underwater currents; operating and maintenance instructions for underwater transceiver, model C 105 and for underwater speech transceiver, model C 400; tests of underwater transmission electric current reception; installation, operation and maintenance of underwater speech transceiver, series UWT-C 500 for Sleeping Beauty-SB II; and tests of UWT installation in Sleeping Beauty.

Page Communications Engineers, Inc., Washington, D. C.
PROJECT TEST RANGE, CONCLUSIONS AND RECOMMENDATIONS. Final rept. on Contract AF 30(602)1756. June 60, 39p. 6 refs. PCE-R-7697A; RADC TR-60-193.
Order from LC mi$3.00, ph$6.30 PB 153 609

A summary of work on the establishment of a vhf ionospheric-scatter test range for use in the evaluation of ionospheric-scatter equipment, systems, and operational techniques, and in making studies leading to selection of such equipment, system designs, and techniques.

Plesset, E. H., Associates, Inc., Los Angeles, Calif.
THE USE OF RADAR AS AN IONOSPHERIC PROBE, by Frances Richey and R. S. Wehner. Scientific rept. no. 1 on Contract AF 19(604)6187. 11 Oct 60, 27p. 14 refs. C25-60(U)40; TR-103; AFCRL-TN-60-1134.
Order from LC mi$2.70, ph$4.80 PB 153 498

An analysis has been made of the feasibility of using radar as an ionospheric probe to measure both electron density and collision frequency as a well-resolved function of space and time, the latter particularly to follow changes in the ionosphere as the result of some natural or artificial disturbance. It is shown that the electron density measurement by means of back-scattered radar return is perfectly feasible for a high-powered, large dish, radar, and for enhanced densities at ranges even as great as 1000 km; for normal ionospheric densities the range is considerably less without pulse integration or data processing. The technique of cross-modulation is investigated for use in determining electron-molecule collision frequency; it is shown that the transfer of modulation at microwave frequencies and normal electron densities is much too small to be detected; however, it is entirely possible that cross-modulation techniques at lower frequencies (1 - 10Mc) may prove useful. This will be further investigated and reported in a subsequent paper. (Author)

Raytheon Co., Waltham, Mass.
QK324 PRODUCTION REFINEMENT AND QK702 DEVELOPMENT PROGRAMS, by H. Morin. Quarterly engineering rept. no. 6, 15 July-15 Oct 58, on Contract DA 36-039-sc-73206. [1958] 24p.
Order from LC mi$2.70, ph$4.80 PB 150 699

The QK324 production refinement has been completed. The results of QK324 evaluation tests indicate that there are no major design problems remaining on the QK324. The 20 QK324 tubes built have met all of the required specifications. Acceptance tests were conducted on four QK702 prototype tubes.

Raytheon Co., Waltham, Mass.
STUDY OF PLATINOTRON DEVICES, by Gerry Perloff and W. C. Brown. Quarterly rept. no. 2, 1 Feb-1 May 59, on QKS-779, Contract DA 36-039-sc-78229. [1959] 26p. 1 ref. AD-228 402.
Order from LC mi$2.70, ph$4.80 PB 153 240

The pure water high pressure cooling system was assembled and preliminarily tested. It was determined that a 2.gal per min flow at a pressure of 1500 lb could be maintained through a filtering system which would take out any particles less than 3 microns in diameter. Cold test equipment was assembled and made ready for operation. Anode construction techniques involving copper brazing of stainless steel were developed and the construction of other subassemblies advanced. (See also PB 148 550)

Rome Air Development Center, Griffiss AFB, N. Y.
A STATE-OF-THE-ART SURVEY OF DELAY TECHNIQUES, by Joseph B. Brauer and Kenneth C. Stiefvater. Sep 60, 47p. 37 refs. RADC-TR-60-146; AD-244 607.
Order from OTS $1.25 PB 171 420

This report released for sale to the public 10 Feb 61 as PB 152 547.

A review is given of important parameters of delay devices, presently used techniques, future requirements of ground electronic systems, and potential new mechanisms for achieving delay, primarily in the frequency range above 1 mc. Carrier frequency techniques employing propagation of both electromagnetic and acoustic waves in solid and gaseous media are reviewed. Circulator and other techniques are discussed as well as periodic delay and amplification structures. (Author)

Rome Air Development Center, Griffiss AFB, N. Y.
SURVIVAL OF GROUND ELECTRONIC SYSTEMS FROM NUCLEAR ATTACK, by Dana A. Benson, K. D. Kirk, and Stanley M. Ostergren. Oct 60, 50p. 13 refs. RADC-TR-60-159; AD-246 449.
Order from LC mi$3.30, ph$7.80 PB 153 205

This report discusses the planning, design, and fabrication of ground electronic equipment systems. Its purpose is to give a comprehensive understanding of the factors that must be considered in providing equipments and systems with survivability. The general aspects and basic approaches to the survival problem are presented. The mathematics and probability theory have been simplified, but for a given application they may be expanded to include all the related possibilities, combinations and influence factors. (Author)

Stanford Electronics Labs., Stanford U., Calif.
ANALYSIS OF NOISE-PRODUCING MECHANISMS IN SOLID-STATE DEVICES, by D. A. Linden. Rept. on Contract Nonr-225(44). 8 Feb 60, 262p. 43 refs. Technical rept. 1551-3; AD-235 651.
Order from LC mi$11.10, ph$41.10 PB 153 169

Methods of analyzing fluctuation phenomena in semiconductor devices are studied with the three-fold aim of presenting a unified treatment of the several techniques, of exploring their interrelations, and of clarifying the assumptions on which they rest. The presentation is addressed to the electronics engineer, and stresses concepts and methods familiar to him through his studies of network theory and communication

theory. Three major analytical approaches are discussed. The thermodynamic method is based on the calculation of ensemble fluctuations by means of statistical mechanics. The Fokker-Planck approach starts with the dynamics of the process expressed in terms of transition probabilities, and yields a differential equation governing the development, in time, of conditional probabilities or probability densities. The Langevin procedure consists of augmenting a phenomenological equation governing macroscopic occurences with noise sources whose responses simulate fluctuation effects. A consistent point of view is achieved by regarding the phenomenological equations as results of averaging the equations governing conditional probabilities; the insertion of noise sources then assumes the status of an approximation designed to restore the detailed knowledge lost in the averaging process. (Author)

Stanford Electronics Labs., Stanford U., Calif.
THE LARGE-SIGNAL PROPERTIES OF MICROWAVE CAVITY-TYPE PARAMETRIC CIRCUITS, by F. A. Olson. Rept. on Contract AF 33(616)6207. 8 Feb 60, 99p. 26 refs. Technical rept. no. 315-1; AD-234 179.
Order from LC mi$5.40, ph$15.30 PB 147 244

A study is made of the large-signal properties — primarily the saturation characteristic and phase response — of microwave cavity-type parametric circuits. Negative-conductance-type amplifiers and frequency converters employing semiconductor diodes are considered. A second-order theory is developed and calculations are made of the large-signal behavior of the parametric circuit when used as an amplifier, as a frequency converter, and as a limiter. Large-signal experiments were performed, on both a parametric amplifier and a frequency converter, to test the predictions of the theory. Results of the measurements of gain and phase as a function of signal level are presented. The agreement with theory is good. A limiter circuit, consisting of two stages of parametric frequency conversion, was tested as a phase-distortionless microwave limiter. The limiter provided an output which was constant to within ±1 db over a range of input greater than 50 db; and had 10 db gain at small signals. (Author)

Stanford Electronics Labs., Stanford U., Calif.
PARAMETRIC AMPLIFICATION WITH SOLID-STATE MATERIAL AND WITH ELECTRON BEAMS, by G. Wade. Rept. on Contract AF 33(616)6207. 23 Nov 59, 23p. 14 refs. Technical rept. no. 303-1.
Order from LC mi$2.70, ph$4.80 PB 150 716

Microwave parametric amplifiers involve a tendency for oscillations to be excited in a dynamical system when an energy storage element of the system is caused to vary in an appropriate fashion. Parametric amplification can be obtained with solid-state materials and electron beams. This paper summarizes characteristics and attainments.

Stanford Electronics Labs., Stanford U., Calif.
A STUDY OF THE ITERATED TRAVELING-WAVE PARAMETRIC AMPLIFIER, by C. V. Bell. Rept. on Contract AF 33(616)6207. 8 Feb 60, 109p. 32 refs. Technical rept. no. 316-2; AD-234 191.
Order from LC mi$5.70, ph$16.80 PB 147 243

This study was undertaken to determine a gain and noise theory for the traveling-wave parametric amplifier. The model that is analyzed is a uniform transmission line which is periodically loaded with parametric diodes. The diodes constitute the variable elements. Across each diode is fed a large pumping voltage which produces a time-varying capacitance. The loss due to the diodes is included as a shunt conductance. The analysis is used to determine the noise figure of the device. The thermal noise due to the diodes is included in the derivation. All other sources of noise within the amplifier are neglected. The analysis shows that certain phase conditions must be satisfied for maximum gain and bandwidth. It is also shown that the reverse gain of the amplifier can be minimized by a proper choice of the pump phase. An experimental amplifier is described. The amplifier was designed for a signal frequency of 1.7 kMc and a pump frequency of 3.4 kMc. The measured gain was 5.0 db with a bandwidth of 270 Mc. The double-channel noise figure was 1.2 db (corresponding to a single-channel noise figure of 4.2 db). The measured values of gain and noise figure are in good agreement with the theory. (Author)

Stanford Electronics Labs., Stanford U., Calif.
THE WAVES ON A FILAMENTARY ELECTRON BEAM IN A TRANSVERSE-FIELD SLOW-WAVE CIRCUIT, by A. E. Siegman. Rept. on Contract AF 33(616)6207. 1 June 59, 33p. Technical rept. no. 157-1; AD-217980.
Order from LC mi$3.00, ph$6.30 PB 150 715

The waves on a filamentary electron beam in a longitudinal dc magnetic field, and their interaction with a transverse-field slow-wave circuit, are studied in detail. All quantities are expressed in terms of circular polarization, with the circuit fields having arbitrary polarization. The beam is found to carry 4 waves: a positively polarized negative-energy slow cyclotron wave, a negatively polarized positive-energy fast cyclotron wave, and two synchronous ($\beta = \beta_e$) waves, one with positive polarization and positive energy, one with negative polarization and negative energy. The coupling of these waves to the circuit is described both in the manner of Pierce's longitudinal traveling-wave-tube (TWT) analysis and in a coupled-mode description. (Author)

Stoddart Aircraft Radio Co., Inc., Hollywood, Calif.
STUDIES, ANALYSES, AND COMPARISONS FOR A TRANSISTORIZED AND MODERNIZED AN/URM-6 TEST SET AN/URM-106(XN-1). Final rept. for 11 Mar 57-11 June 58 on Contract NObsr-72677. [1958] 74p.
Order from LC mi$4.50, ph$12.30 PB 150 712

The purpose of this contract is to modernize and transistorize the design of the AN/URM-6 equipment and to incorporate as many of the latest developments in the art of interference measurement as practicable (Author)

[Thompson] Ramo Wooldridge, Inc., Inglewood, Calif.
BALLOON TELEMETRY, by G. A. McDaniel. Rept. on Contract AF 18(600)1190. 6 May 57, 9p. 1 ref. Rept. no. GM-TM-162; AFBMD Doc. no. 7-4059; AD-217 243.
Order from LC mi$1.80, ph$1.80 PB 153 235

A 45 foot long tethered aerodynamic balloon with a lift capacity of approximately 160 pounds could be used to raise an omni-directional telemetry receiving antenna and battery operated pre-amplifier to a height of about 3,000 feet. The transmission line to the ground would be used as the tethering line. An isotropic antenna at 3,000 feet altitude would provide impact telemetry coverage over a radius of about 30 miles. (Author)

University of Southern California. Engineering Center, Los Angeles.
PLASMA PARAMETRIC AMPLIFIER, by Jim Y. Wada and Zohrab A. Kaprielian. Technical note on Contract AF 49(638)522. Sep 60, 57p. 10 refs. USCEC rept. 79-202; AFOSR-TN-60-1261; AD-247 170.
Order from LC mi$3.60, ph$9.30 PB 153 446

The theory and application of plasmas as nonlinear reactance elements in parametric amplifiers are presented in this paper. The feasibility of parametric amplification is demonstrated by use of a quadrupole cavity model containing a plasma column. Analytical expressions for the power gain and noise figure are derived for the case in which the signal and idling frequencies are sufficiently separated and for the degenerate case in which these two frequencies are equal. The results and their limitations are discussed in some detail. (Author)

Upper Air Lab., U. of Colorado, Boulder.
BIAXIAL POINTING CONTROL, by Fred Wilshusen. Final rept. on Contract AF 19(604)1724. [1960] 53p. [AFCRL]-TN-60-685; AD-247 034.
Order from LC mi$3.60, ph$9.30 PB 153 442

This report is written to give those flying the instruments and other interested people a better understanding of the operation, capacity, and limitations of the rocket-borne solar pointing servo and of its progressive development and present status. The pointing servo is a device designed for attachment to an Aerobee type rocket to continually point an instrument at the sun during the rocket flight. The device is a biaxial servo system in which sensors, or eyes, detect any error in pointing and feed this information to both azimuth and elevation drives to correct the error. All of the various compartments are discussed in detail.

Washington U., Seattle. Coll. of Engineering.
SINUSOIDALLY MODULATED WAVE GUIDES FOR TRAVELING-WAVE ANTENNAS, by Akira Ishimaru. Technical rept. no. 46 on Contract AF 19(604)4098. Sep 60, 47p. 9 refs. AFCRL-TN-60-1117.
Order from LC mi$3.30, ph$7.80 PB 153 555

The sinusoidally varied waveguides produce the waves whose amplitude and phase are modulated along the surface. One wall of the guide is replaced by sinusoidally varied impedance. The spacing between walls is also varied sinusoidally. The Floquet's theorem yields the relations between each harmonic and the propagation constant. The periodic structure is also studied in terms of the generalized kL - βL diagram which includes the leady as well as the slow waves. The successive approximation method is applied to yield relatively simple expressions for the aperture field and it is shown that by suitable choice of various parameters, the desired amplitude and phase of the aperture field can be obtained. (Author)

Westinghouse Electric Corp., Baltimore, Md.
RADIO TRANSMITTING EQUIPMENT, MODEL R-1x, VOLUME 1. Final development rept., vol. 1, 1 Aug 53-30 Sep 56, on Contract NObsr-63455. [1956] 91p.
Order from LC mi$5.40, ph$15.30 PB 150 710-1

The report includes information on the following: (1) Design and development of a LF (low frequency) R-1x (2) Design and development of a HF (high frequency) R-1x. (3) Operational evaluation of a LF and a HF R-1x. (4) Environmental evaluation of a LF R-1x. Volume 1 contains development reports for 1 Aug 53-31 Mar 55.

Westinghouse Electric Corp., Baltimore, Md.
RADIO TRANSMITTING EQUIPMENT, MODEL R-1x, VOLUME 2. Final development rept., vol. 2, 1 Aug 53-30 Sep 56 on Contract NObsr-63455. [1956] 193p.
Order from LC mi$8.70, ph$30.30 PB 150 710-2

Development reports for 1 Apr 55-30 Sep 56. (See also PB 150 710-1)

Westinghouse Research Labs., Pittsburgh, Pa.
SYNTHESIS AND PURIFICATION OF DIELECTRIC MATERIALS, by W. C. Divens, D. H. Hogle and others. Rept. for 1 July 59-30 June 60 on Electrical and Electronic Materials, Contract AF 33(616)5979. Sep 60, 77p. 4 refs. WADC Technical rept. 59-337, Part II.
Order from OTS $2.00 PB 171 364

Progress on the program of preparing purer, improved dielectrics for use as electric insulation at 500°C is described. Boron nitride was prepared with superior properties to any reported. Hot pressed nitride discs show properties which are anisotropic. Anodized aluminum oxide films have good dielectric properties at 500°C, are polarity sensitive, and have resistance decrease with increasing field. Electrode metal adhesion to anodized oxide films was improved by silicon monoxide evaporation in a vacuum, on to which gold was

evaporated without releasing the vacuum. Aluminum oxide films formed by hydrolysis of aluminum isopropoxide had inferior dielectric properties for oxide made by this method. Boron phosphide was synthesized by two means: (1) direct reaction of the elements, boron and phosphorus, and (2) by reaction of boron trichloride, phosphorum and hydrogen. (Author) (See also PB 161 366)

Wisconsin U., Madison.
SURFACE WAVE, ANTENNA AND MICROWAVE FILTER ENGINEERING STUDY, by Elmer H. Scheibe Quarterly progress rept. no. 1, 1 Sep-30 Nov 59 on Contract DA 36-039-sc-78326; Continuation of Contract DA 36-039-sc-77990. 31 Dec 59, 17p. 10 refs. AD-243 871.
Order from LC mi$2. 40, ph$3. 30 PB 153 242

Research is concerned with the theory and design of constant input impedance microwave branching filters. A considerable part of the first period was devoted to equipment modifications. A detailed study of the single and double stage pass filters off the Tee was made. The single and double stage pass filters will form part of the complete constant input impedance branching filter. (Author)

Ordnance, Missiles, and Satellite Vehicles

Aeronautical Research Lab., Air Force Research Div., Wright-Patterson AFB, Ohio.
FERRY OPERATION WITH ELLIPTIC SATELLITE ORBITS, by C. A. Traenkle. Technical rept. Nov 60, 43p. 5 refs. ARL Technical rept. 60-319.
Order from LC mi$3. 30, ph$7. 80 PB 152 321

For special applications, a manned space station may be put intentionally into an elliptic satellite orbit of high numerical eccentricity. The problem of setting up a ferry service to such a station brings in additional variables, as compared with the fundamental circular satellite orbit, namely the position angles of the bodies in their common orbit plane. The control and navigation of the process is represented by characteristic, non-dimensional parameters, arranged in two sets: the geometrical group, giving the shape of the ferry ellipse (major axis, eccentricity), and the kinematical group, giving the constellation angle at the instant of firing, the transfer time and the velocity boosts. For the final coincidence adjustment of the ferry with respect to the station, two additional procedures of Vernier control are developed by generalizing the case of the circular satellite orbit: the correction method by full ferry cycle transit, giving high propellant economy, and the short arc correction, to be applied if a short transfer time is required. The characteristic parameters of the process vary sinusoidally about the mean values, to be compared with the corresponding ones of a circular satellite orbit of mean radius. (Author)

Aeronautical Research Lab., Air Force Research Div., Wright-Patterson AFB, Ohio.
LAYOUT OF SATELLITE FERRY OPERATION, by Carl A. Traenkle. Rept. for 3 July-28 July 60. Oct 60, 32p. 5 refs. ARL Technical rept. 60-313.
Order from LC mi$3. 00, ph$6. 30 PB 152 320

The layout and basic mechanics of a ferry service to a manned space station, moving in a circular orbit is analyzed, by deducing the pertinent relations for the control and navigation of the process. These include the characteristic parameters for the transfer ellipse, the velocity boosts, the constellation angle at the moment of firing of the ferry and the time interval for the transfer. The final coincidence adjustment is made by an additional Vernier control, for which two procedures are devised: the correction method by full ferry cycle transit, distinguished by its propellant economy, and the short arc correction, characteristic for small corrections and short transfer time. The results are expressed in dimensionless parameters and represented in charts of wide applicability. (Author)

Aeronutronic, Newport Beach, Calif.
SPACE VEHICLE EPHEMERIS AND DIFFERENTIAL CORRECTION PROGRAM UNIFIED THEORY, Rept. on Project Space Track, Contract AF 19(604)5885. 14 June 60, 48p. AFCCDD-TN-60-34.
Order from LC mi$3. 30, ph$7. 80 PB 153 744

This report traces the development of a differential correction theory for lunar and space probes. To overcome the singularities inherent in differential processes with conventional two-body descriptions of the path, as the eccentricity passes through unity in either the parabolic or rectilinear sense, a unified formulation of the two-body equations was developed. The differential correction procedure is based upon an ephemeris, integrated in Encke form by special perturbations, and upon differential expressions derived from the unified two-body equations. The report includes experimentation with simulated range, range-rate, azimuth, altitude, right ascension and/or declination data to evaluate the performance of the resulting IBM 709 program. (Author)

Air Force Missile Development Center, Holloman AFB, N. Mex.
CIRCULAR TRACK-CHAMBER. A PROPOSED FACILITY FOR TESTING MAN-MACHINE-SYSTEMS UNDER CONDITIONS OF SPACE FLIGHT AND LUNAR HABITATION, by Hubert C. Feder. Oct 60, 29p. 4 refs. AFMDC TN-60-14.
Order from LC mi$2.70, ph$4.80 PB 153 408

The circular track-chamber, as proposed, combines a 100-foot diameter circular track and a 100-foot diameter hemispherical vacuum chamber into one composite test facility. The purpose of this facility is to test the compatibility of man-machine systems. The anticipated test procedure encompasses the simultaneous and continuous testing of most of the parameters of a complete space flight history from launch through planet life to re-entry and recovery. The facility will handle payload-load factor products up to 2,000,000 pounds and can accommodate a crew of 20 men living and working in a planetary environment. (Author)

Allied Research Associates, Inc., Boston, Mass.
LAUNCHING OF AIRBORNE MISSILES UNDERWATER. PART VI. MISSILE RESPONSE TO WAVE-INDUCED SUBMARINE MOTION, by Theodore R. Goodman and Theodore P. Sargent. Rept. on Contract Nonr-2343(00). 29 Feb 60, 37p. 9 refs. Document no. ARA-720; AD-233 061.
Order from LC mi$3.00, ph$6.30 PB 153 161

The technique of generalized harmonic analysis is employed to derive expressions for the trajectory responses of a slender missile resulting from random initial conditions. The random initial conditions arise from motion of the launching submarine induced by waves of a confused sea and a swell. The submarine is considered to be a hovering, slender body of revolution.

Army Signal Missile Support Agency, White Sands Missile Range, N. Mex.
TITLES AND ABSTRACTS OF SELECTED ARTICLES CONCERNING THE MOTION OF ROCKETS AND ARTIFICIAL SATELLITES, by James S. Bethel. Sep 60, 37p. 109 refs. Missile Electronic Warfare rept. no. 1033.
Order from LC mi$3.00, ph$6.30 PB 153 182

Titles, sources, and abstracts of selected periodical articles related to the motion of rockets and artificial satellites are listed. Articles in this collection appeared in major scientific and engineering journals during the period 1945-1960. (Author)

Ballistic Research Labs., Aberdeen Proving Ground, Md.
THE APPLICATION OF RADIOACTIVE TRACERS TO SHAPED CHARGE LINERS, by M. K. Gainer. Jan 60, 23p. 5 refs. Memo. rept. no. 1242; AD-234 866.
Order from LC mi$2.70, ph$4.80 PB 150 068

Radioactive tracers have been used to study the contribution of different segments of a shaped charge liner to the penetration of steel targets by the jet for confined and unconfined rounds. It was concluded that the effect of confinement is to produce a steady state collapse over all but the base region of the liner, and that nonsteady state collapse takes place over nearly the entire liner when unconfined. (Author)

Ballistic Research Labs., Aberdeen Proving Ground, Md.
THE EFFECT OF STRONGLY NONLINEAR STATIC MOMENT ON THE COMBINED PITCHING AND YAWING MOTION OF A SYMMETRIC MISSILE, by Charles H. Murphy. Aug 60, 52p. 10 refs. Rept. no. 1114; AD-247 271.
Order from LC mi$3.60, ph$9.30 PB 153 425

The usual quasi-linear solution of the nonlinear pitching and yawing motion of symmetric missiles depends on the assumption that the static moment is very close to linear. In this report the Thomas-Reed perturbation technique which originated in astronomical problems is described and applied in detail to the special problem of almost circular motion. The influence of strongly nonlinear static moments on the existence of limit motions is determined for three examples of nonlinear moments. Refinements of the quasi-linear methods are obtained which are in good agreement with the exact theory. The equations derived in the report can be applied to more general motions and such applications are indicated. (Author)

Ballistic Research Labs., Aberdeen Proving Ground, Md.
A METHOD OF SOLUTION FOR THE DETERMINATION OF SATELLITE ORBITAL PARAMETERS FROM DOPLOC MEASUREMENTS, by R. B. Patton, Jr. Rept. no. 7 on ARPA Satellite Fence Series. Sep 59, 63p. Memo. rept. no. 1237; AD-231 388.
Order from LC mi$3.90, ph$10.80 PB 150 724

An extraction is presented of a more comprehensive report (BRL Memo Report No. 1220) which describes the overall effort and progress in the development of the DOPLOC passive detection and tracking system. A description is included of a method of solution for obtaining orbital parameters from doppler data only. It consists of applying successive differential corrections, obtained by a least squares treatment, to a set of initial approximations for the orbital parameters. While the method is directed specifically to DOPLOC data, it is sufficiently general to be applied to any type of satellite tracking data if minor modifications are introduced. Addendums present the results obtained when the method of solution was applied to DOPLOC measurements for revolution no. 4 of Explorer VI and revolution no. 322 of Discover VI, respectively. The orbital parameters, which were determined for Discover VI, agree very well with those published by Space Track. (Author)

Ballistic Research Labs., Aberdeen Proving Ground, Md.
A SUMMARY OF PHOTOGRAMMETRIC RESEARCH AT THE BALLISTIC RESEARCH LABORATORIES, by Dirk Reuyl. Mar 60, 17p. 17 refs. Technical note no. 1304; AD-234 894.
Order from LC mi$2.40, ph$3.30 PB 150 070

The summary of photogrammetric research at the Ballistic Research Laboratories, is concerned with the following: (1) examples of application of the photogrammetric method to specific ordnance problems and its use as a standard of calibration for tracking systems; (2) basic analytical studies of the general photogrammetric problem and development of techniques of measurement and data reduction; (3) development of a precision photogrammetric system, comprising BC-4 ballistic camera and synchronization instrumentation; (4) establishment of a research facility for the evaluation of photogrammetric instruments and systems; and (5) the need for new metric cameras of high light gathering power for application to problems in space probe and satellite research. (Author)

Behavioral Sciences Lab., Wright Air Development Div., Wright-Patterson AFB, Ohio.
HUMAN FACTORS IN DESIGN OF AUTOMATIC PROGRAMMING AND RECORDING FOR TRAINERS (AN/ASG-15-T1 FIRE CONTROL SYSTEM TRAINER), by Allan M. Stave. Aug 60, 14p. 1 ref. WADD Technical rept. 60-558; AD-243 967.
Order from OTS $0.50 PB 171 419

A description is given of the Fire Control System Trainer, AN/ASG-15-T1 for B-52 gunners. This trainer features an automatic recording system and an automatic programming system. The parameters used in recording the student performance are: (1) reaction times, (2) critical target ranges, and (3) a weighted error score displayed in numerical form. Automatic programming is accomplished through the use of motion picture films which control a television presentation to the student. Automatic recording is accomplished through use of a series of timing devices. The ASG-15 demonstrates the sophistication that can be achieved with relatively simple and inexpensive training equipment. (Author)

Defense Metals Information Center, Battelle Memorial Inst., Columbus, Ohio.
ENVIRONMENTAL FACTORS INFLUENCING METALS APPLICATIONS IN SPACE VEHICLES, by J. M. Allen. Rept. on Contract AF 18(600)1375. 1 Dec 60, 49p. 34 refs. DMIC rept. 142.
Order from OTS $1.25 PB 151 101

Metals will be used extensively both in the vehicle structure and in the supporting and auxiliary equipment that is used for space flight. This report describes the specialized environments which are imposed on metals and the possible consequences of these environments. In general, the specialized environments are identified with (1) the natural environment of space, (2) the entry into an atmosphere, or (3) the power-conversion system utilized by the vehicle. (Author)

Diamond Ordnance Fuze Labs., Washington, D. C.
ACCELEROMETER MEASUREMENTS AND PROJECTILE PARAMETERS, by H. J. Rosenberg. 17 Nov 60, 32p. 4 refs. Technical rept. TR-857.
Order from LC mi$3.00, ph$6.30 PB 152 917

The limitations of an accelerometer in the measurement of projectile acceleration, velocity, and displacement are discussed. The design limitations of the instrument, the errors of the associated integration process, and the presence of vibration and gravity cause the accelerometer reading to deviate from the true value. (Author)

Diamond Ordnance Fuze Labs., Washington, D. C.
DEVELOPMENT OF A SPLIT IGNITER FOR INITIATING GASLESS DELAYS, by Ira R. Marcus. 14 Nov 60, 39p. 13 refs. Technical rept. TR-875.
Order from LC mi$3.00, ph$6.30 PB 152 654

An investigation has shown that burning time dispersions in UMNOL gasless delay mixtures can be caused by the A-1-A igniter used to initiate them. The mechanism of this igniter effect is not understood but tests have shown that when A-1-A is used in the input position, it can penetrate the delay mix and ignite it below its surface. A-1-A igniter does not cause time dispersions when it is used in the output position, to transfer ignition from the delay to the next element in the fuze train. A split input igniter made of two different compositions of zirconium, barium chromate, and superfloss powders has been developed to eliminate the penetration and thus reduce the time dispersions attributed to A-1-A. One of these compositions is suitable as an output igniter. Complete specifications for manufacturing these igniters are included. (Author)

Diamond Ordnance Fuze Labs., Washington, D. C.
LONG PERIOD CURPISTOR-DIODE TIMERS, by John O. Thayer. 29 Nov 60, 17p. 7 refs. Technical rept. TR-895.
Order from LC mi$2.40, ph$3.30 PB 153 478

Relaxation-type oscillators for timing purposes have been developed that provide useful output pulses at rates from one pulse per minute to three pulses per day. Methods of accumulating these pulses to produce time delays of up to 1 year are discussed. The primary oscillator components include a curpistor, a mylar or polystyrene capacitor, an XD-1C cold-cathode diode, and a resistive compensating device. Due to the current-regulating curpistor, the variations in timer pulse repetition rate are relatively independent of changes in the low-current battery supply voltage. Supply voltage changes of up to ± 30 percent cause a curpistor current change within ±1 percent. Time variations caused by temperature changes between -40°C and 55°C are within ±6 percent for the longest-period timers tested. Applications for this device include (a) single delay device, (b) generator for an electromechanical or magnetic core accumulator for use in fuze timing, (c) other long-period timing devices. (Author)

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
DETERMINATION OF BEST SPOTTING COMPOSITION FOR OBSERVATION OF HONEST JOHN, by John E. Andrews, Jr. and Leo J. Frey, Jr. Nov 60, 40p. 16 refs. Technical rept. FRL-TR-17.
Order from LC mi$3.00, ph$6.30 PB 150 097

Out of 9 spotting compositions and 3 explosives tested in the laboratory, spotting composition 580 (40% atomized aluminum, 60% barium nitrate) was chosen as relatively safe to handle and use. It withstood a 40-foot drop test when packed and did not detonate when exposed to a fire. Field tests showed that 3 pounds of spotting charge will provide 95% detection of the smoke and flash at 15 miles on a bright hazy day. The bomb-type (spherical flash) vehicles used in these tests were found to be only half as efficient as standard-type spotting devices (which produce a conical flash). For reliability, two spotting devices, 180° apart and each containing a 1.5-pound charge, were used in the final design. Of the various types of instrumentation normally used to observe the Honest John (binoculars, battery command scopes, and aiming circles), the M65 battery command scope was found most efficient for detecting the flash and smoke, and the binoculars were found least efficient. Static test results substantiated the following relationship between weight of charge and total integral light: Total integral light $= K_1 W^{K_2}$. Values were obtained for K_1 and K_2 for each spotting composition tested. (Author)

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
HANDLING PROPERTIES OF THE MONOPROPELLANT SYSTEM 60/40 ETHYL NITRATE/n-PROPYL NITRATE, by Daniel R. Satriana, Frank J. Masuelli, and Ernest F. Stevenson. Nov 60, 20p. 13 refs. Technical rept. FRL-TR-18; AD-247 121.
Order from LC mi$2.40, ph$3.30 PB 152 316

The monopropellant system 60/40 ethyl nitrate/n-propyl nitrate was subjected to various tests. In short-term stability tests, no brown fumes were noted in 30 hours at 96°C or in 64 hours at 65°C. Compatibility with various metals, sealers, polyethylene, and rubber was found to be satisfactory at ambient and elevated temperatures. However, some propellant was absorbed by the polyethylene and, at the elevated temperature, a film formed on the brass and aluminum samples. The auto-ignition temperature and the flash point of the propellant were 192°C and 65°C respectively. Propellant sealed in 37 mm cartridge cases neither detonated nor burned in the 40-foot drop test. When subjected to .30 caliber rifle bullet fire, it burned but did not detonate. Propellant sealed in pipe bombs detonated three times in three trials when impacted with a .30 caliber rifle bullet. No action was observed in friction sensitivity tests. Electrostatic sensitivity tests indicated that serious hazards might exist in the handling of large quantities of the monopropellant. Thixcin, nitrocellulose fibers and ball powder are satisfactory gelling agents for the monopropellant. The burning rate was decreased 1/3 by the use of the nitrocellulose and the ball powder and was increased 7 times by use of the Thixcin formulation. (Author)

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
AN INTERPRETATION OF THE SENSITIVITY OF EXPLOSIVES, by Rufus C. Ling and Werner R. Hess. Dec 60, 13p. 2 refs. Technical rept. FRL-TR-21.
Order from LC mi$2.40, ph$3.30 PB 153 111

An attempt is made to interpret explosive sensitivity data on the basis of the distribution of active sites in the explosive medium. It is assumed that the ignition probability is closely controlled by the population of active sites among the crystallites affected by the external energy source. An expression for the probability of ignition is established and discussed.

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
STANDARD LABORATORY PROCEDURES FOR SENSITIVITY, BRISANCE AND STABILITY OF EXPLOSIVES, by Arthur J. Clear. Jan 61, 45p. Technical rept. FRL-TR-25.
Order from OTS $1.25 PB 171 326

The detailed procedures given in Picatinny Arsenal Technical Report No. 1401, Rev 1 (PB 116 184) for standard laboratory tests to determine the sensitivity, brisance, and stability of high explosives, primers, pyrotechnic compositions, and propellants have been reviewed and revised to bring the methods up to date. Accordingly the directions for several of the procedures have been modified wherever necessary to include details which have been found to be important. Procedures which are either obsolete or seldom used have been omitted. (Author)

Flight Accessories Lab., Wright Air Development Div., Wright-Patterson AFB, Ohio.
GAS CYCLE COOLING SYSTEMS FOR SPACE VEHICLES, by T. D. Moseley. Rept. on Aircraft Air Conditioning. June 60, 23p. 3 refs. WADD Technical note 60-66; AD-245 325.
Order from OTS $0.75 PB 171 363

This study was to determine the conditions when gas cycle cooling systems require the smallest radiators, and to compare these requirements with a passive cooling system. For a one kilowatt cooling load, the power unit's radiator temperature was held constant at 700°F while the cooling system's radiator temperature was varied from 58 to 950°F. Cooling systems providing temperature control for both cabin and electronic equipment compartments were considered. Air and hydrogen, representing low and high specific heat gases respectively, were evaluated. Radiator size decreased with an increase in radiator temperature, except when the radiator area required for a power unit to drive the cooling system was considered. Since the smallest radiator was obtained with the simple passive cooling system, gas cycle cooling systems were considered undersirable for space vehicle applications. (Author)

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
THE TEMPERATURE OF AN ORBITING MISSILE, by A. R. Hibbs. Rept. on Contract DA 04-495-ORD-18. 28 Mar 56, 23p. 3 refs. Progress rept. no. 20-294.
Order from LC mi$2.70, ph$4.80 PB 153 952

This report released for sale to the public 2 Jan 61.

The successful operation of radio equipment carried in an orbiting missile requires fairly close control over the temperatures to which the equipment is subjected. This temperature is controlled by two factors. First, the temperature of the outer shell of the missile depends on radiative transfer between the missile and its environment (sun, earth, and empty space). Second, the temperature of the equipment inside the missile depends on heat transfer from the shell (directly by radiation, and through the structure by conduction). The analysis presented shows (1) how the average temperature of the outer shell can be controlled (for a given missile shape, orientation, and trajectory) by a correct choice of surface coatings, and (2) that that the limits of temperature variation of the enclosed equipment can be held to within a few degrees of this average shell temperature by adequate insulation. Numerical calculations are presented which indicate the necessary characteristics of the coating and insulating materials. (Author)

Lincoln Lab., Mass. Inst. of Tech., Lexington.
SOME RESULTS OF ESTIMATING SATELLITE ELEMENTS FROM MILLSTONE-HILL AVERAGED DATA, by Hans. D. Fridman. Rept. on Contract AF 19(604)7400. 2 Nov 60, 32p. 3 refs. 22G-0039; AD-246 781.
Order from LC mi$3.00, ph$6.30 PB 153 220

The Millstone Hill site of the Lincoln Laboratory is a tracking facility from which raw radar data and data

averaged over intervals of time were obtained. In order to make use of the raw radar data averaged over a number of time intervals a programming facility that calculates the satellite orbit parameter from the known position and velocity of the satellite at a given time of observation was constructed. The system by which the radar data on the satellites was acquired, the techniques by which the data has been filtered and smoothed, and the programming system that made use of this data to evaluate the technique of estimation are described. (Author)

Lincoln Lab., Mass. Inst. of Tech., Lexington.
WEST FORD ORBIT DETERMINATION, by A. A. Mathiasen. Rept. on Contract AF 19(604)7400. 2 Nov 60, 19p. 21G-0028; AD-246 777.
Order from LC mi$2.40, ph$3.30 PB 153 219

The IBM 7090 West Ford Orbit Determination program accepts geocentric coordinate data, from which it determines the orbit parameters (semi-major axis, eccentricity, argument of perigee, inclination, longitude of ascending node, epoch of nodal crossing) existing, and presumed constant, during the time interval of the data. These parameters are then made available to other programs. (Author)

Lincoln Lab., Mass. Inst. of Tech., Lexington.
WEST FORD STATISTICAL ORBIT PREDICTION PROGRAM, by W. R. Crowther. Rept. on Contract AF 19(604)7400. 2 Nov 60, 6p. 21G-0027, supersedes 21G-0019; AD-246 778.
Order from LC mi$1.80, ph$1.80 PB 153 218

A program was written to perform statistical prediction of orbit parameters. It accepts many sets of orbit parameters and determines a least mean squares fit of each parameter to a polynomial with time as its variable. The polynomial may be chosen to be a constant, linear, or quadratic by a control card. (Author)

Lockheed Aircraft Corp., Sunnyvale, Calif.
INTERPLANETARY MANEUVERS USING RADIAL THRUST, by C. M. Petty. Technical rept. on Mathematics. Aug 60, 23p. 4 refs. LMSD-703036; AD-241 227.
Order from LC mi$2.70, ph$4.80 PB 153 055

Basic interplanetary maneuvers are considered, with emphasis placed on simplicity in instrumentation. First, a general theory of radial thrust is developed geometrically, since it reveals a proper perspective of the opportunities and limitations of the theory. The special case of constant radial thrust acceleration is treated in detail. Finally, an example of a Martian capture maneuver is given where the initial portion of the maneuver has constant radial thrust acceleration and in the terminal portion the thrust acceleration varies to maintain constant radial speed. The associated characteristic velocity and other parameters are computed. (Author)

Naval Ordnance Test Station, China Lake, Calif.
RANGES FOR TRAINING AIRCRAFT PILOTS IN SPECIAL-WEAPON-DELIVERY TECHNIQUES, by Everett B. Hill and Elaine Nowak. 1 Sep 60, 42p. NOTS TP 2343; AD-246 254.
Order from LC mi$3.30, ph$7.80 PB 153 086

This report describes instrumentation designed and developed for aircraft ranges used in training pilots in low-level special-weapon-delivery techniques. Range operating procedures, range personnel requirements, and instrumentation costs are discussed. (Author)

North Carolina State Coll., Raleigh.
THE APSIDAL MOTION OF THE ORBIT OF AN EARTH SATELLITE, by Raimond A. Struble. Technical memo. no. 3 on Contract DA 36-034-ORD-2733. Mar 60, 12p. 14 refs. OOR rept. 2125.6-M.
Order from LC mi$2.40, ph$3.30 PB 150 702

Using the equations of motion for an earth satellite developed previously, a study of the motion of the line of apsides of an orbit is presented. Though this study represents but one aspect of a general theory of motion now in preparation, the results are sufficiently novel to warrant this singular announcement.

Physical Research Lab., Space Tech. Labs., Inc., Los Angeles, Calif.
INSTRUMENTATION FOR MAGNETOAERODYNAMIC HEAT TRANSFER, by Richard W. Ziemer. Rept. on Thermonuclear Propulsion Research, Contract AF 04(647)309. 8 Sep 60, 39p. 16 refs. STL/TR-60-0000-09290.
Order from LC mi$3.00, ph$6.30 PB 152 829

An experimental technique is described for directly measuring the stagnation point heat transfer rate to an aerodynamic model in an electromagnetic shock tube. The application to measuring the reduction in aerodynamic heating by magnetoaerodynamic means is specifically considered. The development of the instrument is discussed, and the successful results of preliminary experiments are reported. It is concluded that the technique is practical for magnetoaerodynamic heat transfer measurements and that the present apparatus could be used to study radiative heat transfer from ionized gases. Recommendations for future research are presented. (Author)

Polytechnic Inst. of Brooklyn, N. Y.
A REALISTIC APPROACH TO PROBLEMS OF OPTIMUM ROCKET TRAJECTORIES, by Samuel E. Moskowitz and Lu Ting Rept. on Contract AF 49(638)445. Oct 60, 18p. 3 refs. PIBAL rept. no. 625; AFOSR-TN-60-1342: AD-247 226.
Order from LC mi$2.40, ph$3.30 PB 153 388

This report suggests an approximate method for analyzing problems of optimum rocket trajectories in a plane for which the vehicle experiences minimum flight time or attains maximum altitude. Included within the scope of this report are such questions as an expedient form of the governing equations entering into the functional, when the maximum values of lift and drag forces are significant. (Author)

Poulter Labs., Stanford Research Inst., Menlo Park, Calif.
LUMINOSITY STUDIES OF HIGH VELOCITY IMPACT, by D. D. Keough. Final rept. on Contract AF 19(604)5572. 12 Oct 60, 25p. 12 refs. SRI Proj. no. GU-2858; AFCRL-TR-60-415.
Order from LC mi$2.70, ph$4.80 PB 153 316

An experimental investigation of the light associated with the impact of high velocity microparticles is described. A system capable of producing velocities in the range of 4-5 mm/μsec and of observing the impact effects by means other than terminal observation has been achieved. Multiplier phototube results indicating the energy associated with the phenomenon at varying pressures are reported. A short duration pulse consisting of a fast rise portion followed by an appropriately exponential decay is observed. All work was performed in an air atmosphere ranging in pressure from atmospheric to ~ 16μ. A possible source of luminosity is discussed briefly. The velocity range of calibration of a micrometeorite detector has been extended, with the result that the impinging particle momentum vs detector microphone output is found to be linear. (Author)

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
LUNAR TRAJECTORY STUDIES AND AN APPLICATION TO LUNIK III TRAJECTORY PREDICTION, by A. Petty and I. Jurkevich. Scientific rept. no. 1 for 15 July 60 on Contract AF 19(604)5863. July 60, 109p 12 refs. AFCRL-TN-60-1132; AD-247 577.
Order from LC mi$5.70, ph$16.80 PB 153 492

The study covers three relatively closely connected areas. These are: (1) Design of a fast, accurate, and efficient computer program for computation of lunar trajectories. (2) An application of the resulting computer program to an error analysis of specific lunar trajectories and to the determination of some actual trajectories. As an example the trajectory of LUNIK III has been considered in detail. (3) Tracking program (determination of initial conditions to be used in the equations of motion). (Author)

Sanitation and Safety Engineering

Arctic Aeromedical Lab., Ladd AFB, Alaska.
CONTINUATION OF FACTORS AFFECTING WATER PURIFICATION, by Lester Baribo. Dec 57, 10p. Technical note AAL-TN-57-5.
Order from LC mi$1.80, ph$1.80 PB 153 546

The work has been extended to determine the effect of pH on the disinfecting action of chlorine, iodine, and colloidal silver. The effects of various other factors affecting the action of colloidal silver are also reported. (See also PB 153 519)

Arctic Aeromedical Lab., Ladd AFB, Alaska.
FACTORS AFFECTING FIELD WATER PURIFICATION, by L. E. Baribo. Dec 56, 16p. Technical rept. AAL-TN-56-13.
Order from LC mi$2.40, ph$3.30 PB 153 519

This study was begun to determine what physical and chemical factors are important to sterilization of water under field conditions in Alaska.

Ballistic Research Labs., Aberdeen Proving Ground, Md.
DEVICES FOR REDUCING BLAST EFFECTS IN VENTILATING SYSTEMS, by William J. Taylor, Wesley E. Curtis, and Robert O. Clark. Feb 54, declassified 5 Aug 57. 36p. 6 refs. Technical note no. 869; AFSWP no. 730.
Order from LC mi$3.00, ph$6.30 PB 154 406

This report released for sale to the public 15 Feb 61.

Results of shock tube tests on ten model ventilator designs are reported showing their relative effectiveness in reducing the passage of air shocks. A muffler type ventilator is described which is the most efficient of the designs tested in preventing the passage of air shocks into ventilating systems and reducing the high velocity air flows. (Author)

Ship Building

David Taylor Model Basin., Washington, D. C.
ON THE STRUCTURAL DESIGN OF THE MIDSHIP SECTION, by M. St. Denis. Oct 54, 108p. 29 refs. Rept. C-555.
Order from LC mi$5.70, ph$16.80 PB 153 953

This report released for sale to the public 8 Feb 61.

A consistent and integrated procedure is presented for carrying out systematically the structural design of the midship section of a naval vessel. The report is written in two parts. In the first part the problem is considered in a general manner and the specific theories and methods used in the procedure are introduced. In the second part an illustrative example is worked out for an idealized vessel embodying the simplest possible structure sufficient to illustrate all the points discussed. (Author)

David Taylor Model Basin, Washington, D. C.
SEADAC, THE TAYLOR MODEL BASIN SEAKEEPING DATA ANALYSIS CENTER, by Wilbur Marks and Paul E. Strausser. July 60, 53p. Rept. 1353; AD-245 156.
Order from LC mi$3.60, ph$9.30 PB 152 689

The Taylor Model Basin Seakeeping Data Analysis Center (SEADAC) is described. The methods for preparation, analysis, and storage of data are outlined. Confidence in the system is demonstrated by comparison of SEADAC computation of the spectral density of certain seakeeping events with numerical calculation of the same data. The limitations of the SEADAC are listed and changes that will improve the system's efficiency and extend its capabilities are suggested. (Author)

National Research Labs., Ottawa (Canada).
A SIMPLE APPROACH TO THE MATHEMATICAL SHIP FORM, by P. A. Hamill. Sep 60, 22p. 2 refs. Mechanical Engineering rept. MB-225.
Order from LC mi$2.70, ph$4.80 PB 153 632

Current work on mathematical ship forms is described. Available solutions of the problem of fitting a surface equation to an arbitrary ship are complicated and of limited use. It is desirable that analytical forms be introduced in the design stage, to provide a concise description of the hull and also to assist in the design. A very simple process, whereby certain initial design conditions are mathematically faired, is developed and tested on the forebody of a fine form. The resulting surface would be acceptable as a ship hull. It is suggested that this approach to ship design may offer considerable advantage and should be pursued further. (Author)

Naval Research Lab., Washington, D. C.
SHOCK DESIGN OF SHIPBOARD EQUIPMENT. PART I. DYNAMIC DESIGN-ANALYSIS METHOD, by R. O. Belsheim and G. J. O'Hara. 16 Sep 60, 59p. 8 refs. NRL rept. 5545; AD-243 497.
Order from LC mi$3.60, ph$9.30 PB 149 520

A design-analysis method is presented for the calculation of the shock response of naval shipboard equipments which are not installed on non-linear shock or vibration mounts. It is essentially a simplified model analysis method where the design shock inputs have been empirically obtained from realistic underwater explosion tests, as reinforced by information obtained from theoretical and laboratory studies. The method allows variations in the complexity of analysis dependent upon the importance classification of the equipment by the Navy. Differing energy-absorption capacities for different geometries and loadings, when some plasticity can be allowed, is permitted by the use of an effective yield stress as the failure criterion. Several simple numerical examples are worked out in detail closely following the step-by-step procedure outlined (complete with appropriate formulas) in the main body of the text. (Author)

FOOD, HANDLING, AND PACKAGING EQUIPMENT

Food

Alaska U., College.
THE AVAILABILITY OF EDIBLE PLANTS AND ANIMALS TO THE SURVIVOR IN THE ARCTIC AND SUBARCTIC, by Wilbur L. Libby. Rept. on Contract AF 41(657)28. Dec 56, 10p. 1 ref. Technical note AAL-TN-56-34.
Order from LC mi$1.80, ph$1.80 PB 153 540

This note is designed to inform workers in the survival fields that this project is underway, of the means by which it is being accomplished, and to elicit criticisms of the methods being employed. The objectives of the project are to determine the amount of each environmental type in Interior Alaska, and to determine the plant and animal composition of these types on a qualitative and quantitative basis with particular emphasis on the availability of survival food.

Arctic Aeromedical Lab., Ladd AFB, Alaska.
NUTRITIONAL SURVEY AT ANAKTUVUK PASS, by Horace F. Drury, Miriam Hall and others. Dec 56, 9p. 4 refs. Technical note AAL-TN-56-17.
Order from LC mi$1.80, ph$1.80 PB 153 523

The inhabitants of Anaktuvuk Pass eat substantially the same number of calories with almost exactly the same percentage of fat, and have about the same cholesterol intake as the inhabitants of Ladd Air Force Base. However, the Eskimos eat much more protein and much less carbohydrate.

Arctic Aeromedical Lab., Ladd AFB, Alaska.
RECONSIDERATION OF PEMMICAN AS AN EMERGENCY RATION, by Horace F. Drury. [1956] 5p. 2 refs. Technical note AAL-TN-56-6.
Order from LC mi$1.80, ph$1.80 PB 153 512

The undeniably adverse effects of pemmican alone are due to low blood sugar. This can be alleviated by the periodic administration of very small doses of carbohydrate. The amount of sugar normally consumed in coffee or tea would make an appreciable difference. It should be possible to formulate a satisfactory emergency ration based largely, but not exclusively, on pemmican composed of dehydrated meat and fat. When wrapped simply in foil, this should have a caloric density almost double that of any currently standard ration. (Author)

Packaging

Naval Supply Research and Development Facility, Bayonne, N. J.
TRANSPARENT PACKAGING, by S. Stambler, C. Katz and S. Gordon. 3 May 60, 79p. Engineering rept. no. 2.5082; AD-246 081.
Order from LC mi$4.50, ph$12.30 PB 153 198

This report presents the results of a study to evaluate transparent films for packaging applications. It was determined that no one film could be used as an all purpose military barrier material. Four mil low density polyethylene and laminations of mylar and polyethylene may be used as additional military barrier materials and provide the added property of transparency. Performance requirements based on the needs of the military supply system were developed for transparent films. (Author)

Thompson, John I., and Co., Washington, D. C.
INDIVIDUAL ALUMINUM FEEDING CONTAINERS. PART I. ENGINEERING EVALUATION PHASE. Rept. for 1 Mar-25 Mar 60 on Equipment for Life Support in Aerospace, Contract AF 33(616)7080. Aug 60, 25p. 22 refs. WADD Technical rept. 60-522(I); AD-246 377
Order from OTS $0.75 PB 171 418

An evaluation was made of materials and techniques for fabricating a food container to be used in space flight. Requirements were for a 6-ounce rectangular aluminum container, and associated equipment: a mouthpiece, and quick opening, expelling, and hand sealing devices. A comprehensive literature search supplemented by personal interviews in industry and other interested activities surveyed the present state-of-the-art in the food conning, container fabricating, and related industries. It was concluded that after further design study, complex rectangular, aluminum containers and associated equipment can be produced using present materials and techniques. Pure aluminum alloys are the best container materials; impact extrusion the most promising process; and brazing and resistance welding the heat methods for joining thin-walled aluminum components. Many protective coatings are available to prevent chemical reaction between the container and its contents. Quick opening devices can be adopted from industry-developed openers. Plastics are available for the mouthpiece. Specific materials and techniques for the associated equipment require further design study. (Author)

MACHINERY, FABRICATION, AND ACCESSORY EQUIPMENT

Franklin Ins. Labs. for Research and Development, Philadelphia, Pa.
PERTURBATION ANALYSIS OF THE STABILITY OF SELF-ACTING, GAS-LUBRICATED JOURNAL BEARINGS, by Vittorio Castelli and Harold G. Elrod, Jr. Interim rept. on Contract Nonr-2342(00). Feb 60, 30p. 21 refs. Rept. no. I-A2049-11; AD-234 380.
Order from LC mi$2.70, ph$4.80 PB 153 128

The dynamics of a gas-lubricated journal bearing are studied by using Reynold's equation and the Lagrangian equations of motion. This system of equations is then linearized by the perturbation method. The stability of the bearing is then investigated by studying the location in the complex plane of the roots of the characteristic determinant of the solution of the system of governing equations. (Author)

George Washington U., Washington, D. C.
DETERMINING THE SIZE OF AN OCEAN SHIPPING PIPELINE MEETING A TIME-PHASED MILITARY REQUIREMENT SCHEDULE UNDER CONVOY CONDITIONS, by Ralph B. Hunt and Erling F. Rosholdt. Rept. on Logistics Research Project, Contracts Nonr-761(05) and (06). 17 Feb 60, 34p. 1 ref. Serial T-113/60; AD-232 656.
Order from LC mi$3.00, ph$6.30 PB 153 145

Consideration was given to the size of an export ocean shipping pipeline needed to meet a time-phased military lift requirement schedule under conditions requiring the ships to sail in convoys. The resulting algorithm and tables that are presented are intended for manual computation use. The algorithm minimizes the choice of alternatives that must be made to establish the magnitudes of the ship pipeline requirements through the time-phasing operation. The logic of the decision rules represents a difficult problem for computer programming short of a brute force approach and is a subject for future work. (Author)

Engines and Propulsion Systems

Aerojet-General Corp., Azusa, Calif.
CHARGED-COLLOID PROPULSION SYSTEM, by R. B. Edmonson, C. B. Kretschmer, and L. B. Becker. Quarterly rept. no. 1 on Contract AF 49(638)656. Nov 60, 17p. Rept. no. 0290-01-1; AFOSR-TN-60-1454.
Order from LC mi$2.40, ph$3.30 PB 153 441

Research is summarized on the electrostatic spraying of microscopic droplets of oil. The research is directed toward an understanding of the mechanisms of charge accumulation and electrostatic spraying in high electrical fields. This understanding is necessary for subsequent adaptation of the phenomenon to use in high-efficiency, low-thrust propulsion applications. The work has been directed primarily to the measurement of charge-to-mass ratios and particle size distributions. Effective spraying of Octoil with an additive of tetra-n-butyl ammonium has been attained at a pressure of 10^{-6}-mm Hg utilizing a porous non-conductive element for feeding the liquid propellant oil mixture. (Author)(See also PB 146 178)

Air Force Missile Development Center, Holloman AFB, N. Mex.
RELATIVISTIC TREATMENT OF ROCKET PROPULSION WITH FAST PARTICLES AND PHOTONS TAKING INTO CONSIDERATION NUCLEAR DATA, by T. Foelsche (U. of Frankfurt-Main). Mar 59, 26p. 6 refs. AFMDC TR-59-4; AD-209 328.
Order from LC mi$2.70, ph$4.80 PB 150 719

Only normal matter is available in sufficient amounts, and it reacts with a maximum mass conversion factor of only 9/1000 for nuclear-physical reasons. This fact limits the end velocity of a rocket to a few tenths of the velocity of light, so that relativistic velocities and an essential time dilatation cannot be attained.

Ballistic Research Labs., Aberdeen Proving Ground, Md.
AN EXPERIMENTAL STUDY OF COMBUSTION INSTABILITY IN SOLID ROCKET PROPELLANTS. PART II, by Leland Watermeier. Sep 60, 67p. 18 refs. Rept. no. 1116.
Order from LC mi$3.90, ph$10.80 PB 153 493

Double base and composite rocket propellant slabs were burned in a transparent - walled vessel which was vented to the atmosphere through a nozzle. The propellants were burned at chamber pressures of 200-800 psi. Pressure waves normal to the burning surface were produced by a siren at frequencies of 100-1400 cps. Photographs and pressure records revealed an increased burning rate in double base propellant as the resonant frequency of the chamber was approached. In aluminized propellants, the burning aluminum particles agglomerated on the surface and left as globules which broke up the normal flame zone. (Author) (See also PB 143 263)

Dynamic Analysis and Control Lab., Mass. Inst. of Tech., Cambridge.
FRICTION DRAG ON BLADED DISCS IN HOUSINGS AS A FUNCTION OF REYNOLDS NUMBER, AXIAL AND RADICAL CLEARANCE AND BLADE ASPECT RATIO AND SOLIDITY, by Robert W. Mann and Charles H. Marston. Rept. on Contract AF 49(638)289. 31 Dec 59, 16p. 7 refs. Rept. no. 124; AFOSR TR-60-95; AD-244 482.
Order from LC mi$2.40, ph$3.30 PB 152 525

Extra losses from partial admission operation of a gas turbine occur both in the nozzle flow arc and away from it. The latter have been related to the theory of fluid flow over a rotating disc expressing a dimensionless moment coefficient as a function of Reynolds number. By direct measurements of drag torque, the moment coefficient has been determined over a range of Reynolds number from 2.0×10^4 to 4.5×10^6 for several aspect ratios, axial and radial shroud clearances, and solidities. Losses increase with increasing aspect ratio. Small increases from minimum practical clearance have little effect, but blade pumping losses become severe at radial and axial clearances of the order of half the disc radius. Typical changes in solidity have only small effects on losses. (Author)

Michelson Labs., Naval Ordnance Test Station, China Lake, Calif.
A NEW RESEARCH TOOL: THE TRANSPARENT SOLID-FUEL ROCKET MOTOR, by Henry T. Sampson. Oct 60, 9p. Technical Article 7; NOTS TP 2458.
Order from LC mi$1.80, ph$1.80 PB 153 286

This article describes a new device by which the burning pattern of a solid-fuel rocket motor can be observed directly during motor operation, and correlated with pressure and thrust data also taken from the firing. The information derived by this tool's use, coupled with knowledge of propellant geometry and pressure and thrust information, will aid the design engineer in correlating conventional theoretical motor-design parameters with actual performance of a test motor.

Naval Ordnance Test Station, China Lake, Calif.
COMPARISON OF EXPERIMENTAL AND THEORETICAL PRESSURE DISTRIBUTION CAUSED BY GROUND INTERFERENCE EFFECTS ON HORIZONTAL-WEDGE TEST-TRACK SLEDS, by D. Philip Ankeney. 15 Aug 60, 28p. 5 refs. NOTS TP 2533; NAVWEPS rept. 7564; AD-245 484.
Order from LC mi$2.70, ph$4.80 PB 152 790

Aerodynamic pressure on the underside of two transonic horizontal-wedge rocket-propelled test sleds is predicted by simple one-dimensional 'choking theory' The theoretical prediction is compared to telemetered pressure data from the two sleds. Good agreement between theory and experiment is obtained despite the simplifications of the one-dimensional theory. The problem of obtaining shock-wave attachment in order to decrease the pressure loads is discussed, and the beneficial effect of 'bleed area' in promoting shock attachment is noted. Sled aerodynamic shapes designed to avoid ground interference of choking effects are discussed. (Author)

Naval Ordnance Test Station, China Lake, Calif.
THE THEORETICAL COMPUTATION OF EQUILIBRIUM COMPOSITIONS, THERMODYNAMIC PROPERTIES AND PERFORMANCE CHARACTERISTICS OF PROPELLANT SYSTEMS, by H. N. Browne and Mary M. Williams. 8 June 60, 59p. 7 refs. NOTS TP 2434; NAVWEPS rept. 7043; AD-246 591.
Order from LC mi$3.60, ph$9.30 PB 153 181

A computer program has been developed for the calculation of the high temperature thermodynamic properties and performance characteristics of propellant systems. This report is a summary of the methods and equations used in the program which will handle a maximum of 12 chemical elements and 70 combustion products. Flame temperature, chemical composition, enthalpy, entropy, specific heat ratio and molecular weight of both the chamber and exhaust, frozen and shifting equilibrium specific impulse, boost velocities, relative boost velocities, thrust coefficient, characteristic velocity, and exhaust gas velocity are computed. The assumptions made, the limitations imposed, and the input data required for the solution of a specific problem by use of this program is discussed in detail. The appendices provide a working guide for those using the program. (Author)

Naval Ordnance Test Station, China Lake, Calif.
TRANSIENT BEHAVIOR OF ROCKET SLEDS AT THE TIME OF STARTING, by D. Philip Ankeney. 1 Sep 60, 86p. 12 refs. NOTS TP 2532; NAVWEPS rept. 7563.
Order from LC mi$4.80, ph$13.80 PB 153 290

An experimental study of the transient response of a rocket sled having a vertically malaligned center of gravity and being subjected to sudden thrust by the ignition of a rocket motor was undertaken. Experimental vertical-force reaction data were obtained from strain-gage-instrumented front skids of the rocket sled. The experimental data are compared with the results from a two-degree-of-freedom theoretical sled model which had nonlinearity introduced by skid gaps. The theoretical model was evaluated on a Mid-Century analog computer and reproduced the major features of the experimental data during the transient response period of 0.2 sec, representing 20% of the burning time of the motor. The theoretical sled model study was confined to the lowest harmonics of the translational and pitching motions and their coupled effects. (Author)

Physical Research Lab., Space Tech. Labs., Inc., Los Angeles, Calif.
THE STRUCTURE OF AN ELECTROMAGNETICALLY DRIVEN SHOCK, by Vernal Josephson and Richard W. Hales. Rept. on Thermonuclear Propulsion Research, Contract AF 04(647)309. 15 Sep 60, 33p. 9 refs. STL/TR-60-0000-19313.
Order from LC mi$3.00, ph$6.30 PB 152 830

A diagnostic study of shocks produced by an electrically driven conical shock tube shows that high velocity (30-100cm/μsec) ions are accelerated out ahead of the luminous shock front by high electric fields generated by "sausage" instabilities in the conical discharge tube. Further, the high velocity luminous front is produced by the sequential pinching of the hot ionized gas along the axis of the discharge tube, in contrast to "current loop" driven shocks in conventional T-tube discharge configurations. (Author)

METAL CUTTING BIBLIOGRAPHY, 1943-1956. 1960, 1v. 18000 refs.
Order from American Society of Tool and Manufacturing Engineers, 10700 Puritan Ave., Detroit 38, Mich. $20.00

Supplements 1954 bibliography by O. W. Boston covering period 1864-1943 and compiled for purpose of reviewing present state of the art. Informative abstracts provided for 5593 selected references, foreign and domestic, and arranged in 15 major sections by cutting process. Covers chip forming operations, with subsections relating to Theory, Experimental Tests and Techniques, and Shop Practice. Author and detailed subject indexes provided. (Author)

Army Signal Research and Development Lab., Fort Monmouth, N. J.
FERRITE SPHERE GRINDING TECHNIQUE, by John L. Carter, Edward V. Edwards, and Irving Reingold. 1 June 58, 9p. 3 refs. USASRDL Technical rept. 2049; AD-225 462.
Order from LC mi$1.80, ph$1.80 PB 150 706

A unique method for accurately and rapidly grinding small ferrite spheres is described. A standard metallurgical grinder was modified in a manner which enable the grinding of samples that are spherical to within 0.001 inch. The procedure described makes it unneces sary to resort to the conventional technique of tumbling the samples in a hollow grinding wheel by means of an air stream. (Author)

Carnegie Inst. of Tech., Graduate School of Industrial Administration, Pittsburgh, Pa.
BUDGET CONTROL AND COST BEHAVIOR, by Andrew C. Stedry. ONR Research memo. no. 63 on Planning and Control of Industrial Operations, Contract Nonr-76001. May 59, 76p. 85 refs. AD-220 282.
Order from LC mi$4.50, ph$12.30 PB 150 713

The relations that might exist between individual performance and aspiration levels and the relations that might also exist between these variables and the kind of external goals which are represented by a budget of the kind commonly employed in management practice were investigated. Experimental results indicate that an implicit budget (where the subject is not told what goal he must attain) produces the best performance, closely followed by a medium budget and a high budget. The low budget, which was the only one which satisfied the criterion of "attainable but not too loose" resulted in performance significantly lower than the other budget groups.

Defense Metals Information Center, Battelle Memorial Inst., Columbus, Ohio.
PHYSICAL AND MECHANICAL PROPERTIES OF SOME HIGH-STRENGTH FINE WIRES, by D. A. Roberts. [Rept. on Contract AF 33(616)7747]. 20 Jan 61, 21p. DMIC memo. 80.
Order from OTS $0.50 PB 161 230

High-strength fine wires are of increasing interest to the Department of Defense and to defense contractors and subcontractors as possible materials of construction in rocket-motor cases, pressure vessels, aircraft cable, high-temperature parachute cloth, and other applications. In spite of this increasing interest, only relatively little, widely scattered information has been available. The data in this memorandum cover wires of 0.010-inch diameter or smaller having tensile strengths in excess of 250,000 psi. No effort was made to evaluate the merits of the different types of wire for specific applications or to appraise the validity of the test data. Copper-base and precious-metal alloy wires are not included.

Lockheed Aircraft Corp., Sunnyvale, Calif.
HIGH-IMPACT METAL FORMING, 1957-1960. AN ANNOTATED BIBLIOGRAPHY, by A. A. Beltran. July 60, 40p. 130 refs. Special Bibliography SB-60-25; LMSD-703045; AD-241 995.
Order from OTS $1.00 PB 171 379

Although explosive forming is the prime concern of this bibliography, articles and reports on hydrospark forming, electro-discharge machining, impact extruding, and the shooting of bolts into metals have been included. The sources consulted include the card catalog of the Armed Forces Technical Information Agency the various catalogs of LMSD's Technical Information Center, and the publications listed below: (1) Aero/Space Engineering; (2) Battelle Memorial Institute, Defense Metals Information Center - Bibliography on Explosive Metal Working, Memo No. 51, 7 April 1960; (3) Battelle Technical Review; (4) Crerar Metals Abstracts; (5) Battelle Memorial Institute, Defense Metals Information Center - Selected Accessions; (6) Engineering Index; (7) American Society for Metals - Review of Metal Literature; and (8) Armed Services Technical Information Agency - Technical Abstract Bulletin. (Author)

Princeton U., N. J.
ECONOMETRIC ANALYSIS OF THE UNITED STATES MANGANESE PROBLEM. Technical rept. no. 4 (Final rept. pt. 2) on Contract Nonr-1858(02). 15 Mar 60, 91p. 19 refs. Econometric Research Program research memo. no. 14; AD-237 728.
Order from LC mi$5.40, ph$15.30 PB 147 534

Effort was directed towards the determination of the lowest-cost policy which would provide the United States' economy with the required quantities of a certain strategic material, manganese. This policy should enable the requirements to be met over a given period of time and in view of various possible political situations. The factors taken into account in determining such a policy were: the various types of alloys and the quantities of them that will be required by the steel industry, the availability of foreign ores and the circumstances under which they can be brought to this country, the availability of (lower grade) domestic ores and the various techniques of upgrading them, the conditions governing the policy of stockpiling ores, and the various political situations that might arise during the ten-year period. Two models are presented which dealt with the manganese problem: a non-stochastic model which covered a 6 yr period of

"limited war," and a preliminary stochastic model which took into account possible changes in the political situation. A description of a more comprehensive stochastic model and the results obtained from it are also presented. (Author) (See also PB 143 225)

Springfield Armory, Mass.
ULTRASONICS IN THE CHROMIUM PLATING PROCESS AND IN COPPER PLATING OF TITANIUM, by G. Pributsky and W. M. Kisner. 25 Jan 60, 27p. 6 refs. Technical rept. SA-TR16-1116; AD-246 631.
Order from LC mi$2.70, ph$4.80 PB 153 223

An investigation was made to determine the effect of ultrasonic vibrations on the appearance, the adhesion, and the corrosion resistance of subsequent chromium plating. An investigation was also made to evaluate the effect of the use of ultrasonic vibrations during the electrodeposition of copper on titanium. Chromium plated drill rods were ultrasonically irradiated in dilute chromic acid in order to passivate the base metal in the pores and cracks of the chromium plate. These rods were evaluated in a salt spray cabinet. No improvement in the corrosion resistance of the specimens was evident. In all instances the application of ultrasonics did not prove beneficial. Test procedures are described and results discussed. (Author)

Watertown Arsenal Labs., Mass.
DEVELOPMENT OF HIGH WELD-JOINT EFFICIENCIES IN A WORK-HARDENING STAINLESS STEEL, by William P. Hatch, George M. Orner, and Warren C. Malatesta. Oct 60, 68p. 6 refs. Technical rept. no. WAL TR 648.4/1; AD-246 835.
Order from LC mi$3.90, ph$10.80 PB 153 263

Work-hardened stainless steel sheet materials are attractive for missile work because their properties include high strength in conjunction with corrosion resistance and relatively good low-temperature toughness characteristics. A project was initiated with the objective of making single thickness butt-weld joints having tensile and yield efficiencies approaching 100% by cold-working of the weld joint. Techniques involving cold work at sub-zero temperatures were utilized to obtain the desired joint efficiency with tensile failures occurring in the base metal in 1/16" full-hard 301 stainless steel. Excellent ductility was exhibited in the immediate vicinity of the fractures with this material in the high-strength condition. Additional study of notch sensitivity is recommended in connection with any plans for structural applications of this type of sheet material.

Wyman-Gordon Co., North Grafton, Mass.
EVALUATION OF NUMERICALLY CONTROLLED MACHINING OF FORGING DIES, by A. H. Swift and W. C. Brunner. Final technical engineering rept. for Dec 57-Mar 60 on Contract AF 33(600)36176. Sep 60, 80p. AMC Technical rept. 60-7-667a.
Order from OTS $2.00 PB 171 378

Numerically controlled machining of forging dies provided a superior finish and greater accuracy as compared to conventional methods of die sinking. The continuing development of programming techniques, specifically the mode of communication between the human element and the machine, to translate drawing information into control tapes which direct the tool aided in moving from simple shapes to more complex configurations. Seven die blocks were programmed. Six blocks machined were production forging dies capable of producing finished forged parts. Former or blocker dies, which have blended or "faired" surfaces, were not attempted. Operational problems posed no particular difficulties after the normal break-in period.

MATERIALS

Watertown Arsenal Labs., Mass.
SPECTRUM AND CONTOUR ANALYSIS OF ULTRASONIC PULSES FOR IMPROVED NONDESTRUCTIVE TESTING, by Otto R. Gericke. Dec 60, 19p. 2 refs. Technical rept. no. WAL TR 830.5/1.
Order from OTS $0.50 PB 171 186

A novel technique for obtaining the ultrasonic attenuation/frequency relationship in a single operation is suggested and investigated. This new method employs ultrasonic pulses which contain energy over a wide band of frequencies, and uses a spectrum analyzer to detect the frequency dependence of ultrasonic attenuation. (Author)

Ceramics and Refractories

Avco Corp., Wilmington, Mass.
THE VAPORIZATION AND PHYSICAL PROPERTIES OF CERTAIN REFRACTORIES. PART I. TECHNIQUES AND PRELIMINARY STUDIES, by A. A. Hasapis, M. B. Panish and C. Rosen. Rept. for 1 Oct 59-31 May 60 on Material Thermal Properties; and Materials Analysis and Evaluation Techniques, Contract AF 33(616)6840. Oct 60, 73p. 12 refs. WADD Technical rept. 60-463, Part I.
Order from OTS $2.00 PB 171 413

The heat of vaporization of Rh was found to be 129 K cal/mole in the range of 2051 to 2205°K by a Knudsen effusion technique. Interactions between ThO_2, Al_2O_3, and W have been studied. The viscosity of fused SiO_2 is 104.44 poises at 2560°C and that of Al_2O_3 is 13 poises at 2200°C. A continuously monitored effusion apparatus, a null-point effusion apparatus, an oscillating cup viscometer, and a sessile drop apparatus have been constructed and calibrated. (Author)

Bell Aircraft Corp., Buffalo, N. Y.
INVESTIGATION OF THE FEASIBILITY OF UTILIZING AVAILABLE HEAT RESISTANT MATERIALS FOR HYPERSONIC LEADING EDGE APPLICATIONS. VOLUME IV. THERMAL PROPERTIES OF MOLYBDENUM ALLOY AND GRAPHITE, by I. B. Fieldhouse, J. I. Lang (Armour Research Foundation) and H. H. Blau (Arthur D. Little, Inc.). Rept. for July 58-July 60 on Ceramic and Cermet Materials, Contract AF 33(616)6034. Oct 60, 86p. 4 refs. WADC Technical rept. 59-744, Vol. IV.
Order from OTS $2.25 PB 171 390

The purpose of this contract was to investigate the feasibility of utilizing available heat resistant materials in the fabrication of leading edges for hypersonic boost-glide vehicles. This particular volume presents the results of measurements of the thermal conductivity, specific heat, linear thermal expansion, and emittance of a 0.5% titanium alloy of molybdenum, and of siliconized ATJ graphite as a function of temperature. Emittance measurements were made on coated and uncoated materials. (Author)

Defense Metals Information Center, Battelle Memorial Inst., Columbus, Ohio.
REFRACTORY METALS IN EUROPE, by R. I. Jaffee. [Rept. on Contract AF 33(616)7747]. 1 Feb 61, 6p. DMIC memo. 83.
Order from OTS $0.50 PB 161 233

Europe is experiencing a surge of activity in refractory metals. As an example, there may be cited the recent conference on columbium, tantalum, molybdenum, and tungsten held by the University of Sheffield on September 19-20, 1960. Only a month later, materials specialists from NATO countries met in Athens, Greece, and Istanbul, Turkey, to take action on plans to initiate a cooperative NATO program on refractory metals.

Douglas Aircraft Co., Inc., Long Beach, Calif.
INFLUENCE OF ENVIRONMENT ON CERAMIC PROPERTIES, by George R. Pulliam and Bruce G. Leonard. Rept. for May 59-May 60 on Solid State Research and Properties of Matter, Contract AF 33(616)5875. Oct 60, 30p. 8 refs. WADD Technical rept. 60-338.
Order from OTS $0.75 PB 171 398

This study was concerned with environmental and nonstoichiometric effects on three different materials. The materials used were ZrO_2, AgCl and MgO single crystals. Definite evidences of low temperature plastic strain were found for O-deficient ZrO_2. These evidences were non-linear stress-deflection curves at room temperature, appearance of slip lines on large grains after stress, and creep of ZrO_2 at 350°C. The creep of polycrystalline AgCl was found to be highly sensitive to electromagnetic radiation. When an AgCl specimen in creep was illuminated with 440mu light the creep rate was reduced and light of 700mu caused the previously reduced creep rate to be increased. MgO single crystals colored brown by u. v. irradiation were found to have an absorption peak at 4.3 eV associated with oxygen. Ultra-violet irradiation increased the height of this peak so that it tailed off in the visible region. It is this tailing off that imparted the brown color to the crystals. Vacuum treatment of such specimens to 1300°C removed the peak and prevented further coloration by ultra-violet illumination. (Author)

Little, Arthur D., Inc., Cambridge, Mass.
STABILITY OF CERAMIC MATERIALS AT TEMPERATURES TO 2000°C, by Joan Berkowitz. Rept. for Jan 59-Jan 60 on Ceramic and Cermet Materials Development, Contract AF 33(616)6154. Sep 60, 68p. 65 refs. WADD Technical rept. 60-377.
Order from OTS $1.75 PB 171 405

A study was made of the oxidation resistance of a number of commercial samples of $MoSi_2$ and WSi_2 in the temperature range 1600-1700°C. A thermal conductivity technique was developed to measure oxygen pick-up by the samples continuously. From the thermal conductivity measurement and the net weight change of the samples, an estimate was made of the rates of formation of volatile and non-volatile oxides. On the basis of X-ray analysis, oxidation products are believed to be volatile XO_3 (vapor) and non-volatile glass of the form SiO_2 nXO_m where X=Mo or W; n and m are not known. Tests were conducted at a total pressure of one atmosphere in a helium stream containing about 10 mm of oxygen and flowing at 119 cc/min. The oxidation of WSi_2 was also studied in a helium stream containing 5 mm of water vapor. The principal solid product in this case was metallic tungsten. (Author)

Manufacturing Labs., Inc., Cambridge, Mass.
INVESTIGATION OF DIFFUSION BARRIERS FOR REFRACTORY METALS, by E. M. Passmore, J. E. Boyd and others. Rept. for May 59-May 60 on Finishes and Materials Preservation, Contract AF 33(616)6354. Aug 60, 59p. 14 refs. WADD Technical rept. 60-343; AD-246 559.
Order from OTS $1.50 PB 171 400

Twenty-three base-barrier metal combinations were screened by annealing diffusion couples at 1700±15°C. Measurements indicating the extent of interdiffusion between barrier and base metals were made by metallographic examination, microhardness tests, and electron microbeam analysis. From these measurements, it is concluded that Hf and Ir are the most promising barriers for W at 1700°C, with V as a third choice. Ir appears to be the best choice for Ta and Mo. No recommendations could be made for Cb base metal, primarily because of melting at the screening temperature. A comparison of interdiffusion behavior with base-barrier phase relations indicates no correlation with either solid solubility or presence of intermediate phases. The melting points of both barrier and base appear to be the most important factors affecting the extent of interdiffusion. (Author)

Metals Research Lab., Brown U., Providence, R. I.
RADIATION EFFECTS INVOLVING THE (n, α) REACTION IN GLASS CONTAINING BORON, by Rohn Truell and Constantine Mylonas. Rept on Contract AF 49(638)450. 1 Oct 60, 35p. 2 refs. AFOSR-TR-60-160.
Order from LC mi$3.00, ph$6.30 PB 153 439

The damage effects produced in 7070 glass by means of the slow neutron reactions with B^{10} have been examined by means of the measurement of physical dimensions, by photoelastic measurements, and by means of ultrasonic methods. The measurement of sample lengths as a function of irradiation time or flux shows that although there are large changes in dimensions as the result of annealing, the irradiation changes are apparently independent of the annealing changes. The curve of length contraction as a function of irradiation flux is not linear. Photoelastic determination of optical-stress characteristics has been carried out with higher precision than previously.

Ultrasonic attenuation and velocity measurements are valuable in annealing experiments but they are not at present useful for "in reactor" study of damage with this material. (Author)

National Carbon Co., Inc., Parma, Ohio.
RESEARCH STUDY TO DETERMINE THE PHASE EQUILIBRIUM RELATIONS OF SELECTED METAL CARBIDES AT HIGH TEMPERATURES, by R. T. Dolloff. Rept. for Jan 59-Mar 60 on Ceramic and Cermet Materials, Contract AF 33(616)6286. July 60, 28p. 13 refs. WADD Technical rept. 60-143; AD-244 270.
Order from OTS $0.75 PB 171 365

The work reported is the result of an investigation of phase equilibria in the ternary system, silicon-boron-carbon. Techniques for extending the high temperature range of measurements have been developed. Accurate phase diagrams for the silicon-carbon and the boron-carbon binaries have been obtained and details of the ternary system have been determined in the high carbon content region. The data were obtained by high temperature differential thermal analysis and by photoelectric thermal analysis, both supplemented by metallographic, X-ray and chemical techniques. Results for the boron-carbon binary system indicate that boron melts at 2130± 10°C and that B_4C has a congruent melting point of 2470± 20°C. Boron and B_4C form a eutectic at 2080± 20°C, whereas carbon and B_4C form a eutectic at 2390± 20°C. Results for the silicon-carbon binary indicate a eutectic between silicon and SiC at 1402± 5°C. SiC melts incongruently at 2540± 40°C. The peritectic point is located at 27 per cent carbon. Results for the ternary system indicate a eutectic between B_4C, SiC and carbon at 2250± 20°C. No compound formation has been observed in the high carbon region of the ternary system. (Author)

Nuclear Metals, Inc., Concord, Mass.
REFRACTORY METAL CONSTITUTION DIAGRAMS, by A. R. Kaufmann, J. Wulff (Mass. Inst. of Tech.), A. Taylor (Westinghouse Research Labs.) and others. Rept. for July 58-30 June 60 on Contract AF 33(616)6023 Oct 60, 197p. 57 refs. WADD Technical rept. 60-132.
Order from OTS $3.00 PB 171 391

Nine binary constitution diagrams and one ternary constitution diagram of some of the refractory metals are presented. The binary diagrams include Hf-Mo, Hf-Re, Gf-W, Nb-Re, Os-Ta, Os-W, Re-Ta, Ru-Ta, Ru-W and the ternary is Re-Ta-W. Care was taken to obtain reliable diagrams. In particular the purity of the constituents (99.9 percent plus) was protected at all times, and the temperatures were measured to an accuracy within ± 20°C. (Author)

Fuels, Lubricants, and Hydraulic Fluids

Army Engineer Research and Development Labs., Fort Belvoir, Va.
DEVELOPMENT OF OPERATIONAL DISPATCHING FACILITY FOR MILITARY MULTI-PRODUCT PIPELINE SYSTEM, by T. H. Jefferson. 29 Apr 60, 69p. Technical rept. 1626-TR; AD-239 399.
Order from LC mi$3.90, ph$10.80 PB 153 078

Studies were made of methods of dispatching fuel in multi-product pipeline systems and the design and fabrication of two prototype operational facilities. Methods studied included graphic method, tabular method, and stream tape method. Results indicated that the stream tape method is the most accurate, most flexible, and easiest to operate, especially for large numbers of batches of various products and that it is, therefore, the most desirable for military use. (Author)

Brussels U. (Belgium).
INFLUENCE OF EROSIVE BURNING ON INTERNAL BALLISTICS, by J. A. Vandenkerckhove. Technical note no. 1 on Contract AF 61(052)354. Oct 60, 52p. 15 refs. AFOSR-TN-60-1403.
Order from LC mi$3.60, ph$9.30 PB 153 299

Empirical laws do not describe accurately the influence of erosive burning and the factors influencing the burning rate without erosion apparently do not retain their influence in the presence of a high velocity flow. It is preferable to base internal ballistics computations on actual experimental data and a method is proposed for calculating the front pressure as a function of combustion to throat, and throat to port area ratios. The method is rigorous for a constant port area and it is also shown that a small port area taper along the grain length does not introduce a significant error. Finally the problems of constant mass velocity and constant burning rate designs are briefly discussed. (Author)

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
THE EFFECT OF STRUCTURE ON COMBUSTION STABILITY OF LIQUID-PROPELLANT ROCKETS DURING FLIGHT AND DURING STATIC-TEST-STAND FIRINGS, by Robert S. Wick. Rept. on Contract DA 04-495-ORD-18. 29 July 55, 40p. 4 refs. Progress rept. no. 20-274.
Order from LC mi$3.00, ph$6.30 PB 154 411

This report released for sale to the public 15 Feb 61.

The influence of vehicle structure on combustion stability in liquid-propellant rockets during flight, when the mass distribution throughout the vehicle and the height of propellants in the feed tanks change, is analyzed. The results of the analysis are discussed with regard to the possibility of obtaining, during early stages of the development of a propulsion system, assurances that the final vehicle into which it will be incorporated will operate stably in flight. The effect of test-stand structure on stability is also discussed. (Author)

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
THE EFFECT OF VEHICLE STRUCTURE ON COMBUSTION STABILITY IN LIQUID-PROPELLANT ROCKETS, by Robert S. Wick. Rept. on Contract DA 04-495-ORD-18. 1 Dec 54, 52p. 15 refs. Progress rept. 20-248.
Order from LC mi$3.60, ph$9.30 PB 154 410

This report released for sale to the public 15 Feb 61.

The effect of vehicle structure on combustion stability of liquid-propellant rocket motors has not been considered in previous analyses. The basic premise of these analyses has been that the propellant feed system is coupled to the combustion chamber only through the action of the chamber pressure on the exit of the propellant feed system. In the present analysis, the fact that the combustion chamber is actually coupled to the propellant feed system through the structural connection between the feed system and the combustion chamber is taken into account. Thus the rocket motor, when mounted in a vehicle, has several feedback loops instead of the single one considered in the conventional analyses. A general analysis is developed and then applied to a simplified monopropellant rocket-propelled vehicle. The effect of the additional loops on combustion stability in the rocket thrust chamber is shown in some instances to be more important than that of the parameters which in a single-loop analysis are usually considered to be the governing quantities. (Author)

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SIMPLIFIED METHOD FOR TESTING THE ACCEPTABILITY OF FUMING NITRIC ACID FOR STORAGE AND USE AS AN OXIDIZER FOR ROCKET FUELS, by David M. Mason and Stephen P. Vango. Rept. on Contract DA 04-495-ORD-18. 29 Jan 54, 18p. 12 refs. Progress rept. no. 20-229; AD-49 219.
Order from LC mi$2.40, ph$3.30 PB 153 948

This report released for sale to the public 1 Feb 61.

A method employing the measurement of the temperature and electrical conductance of fuming nitric acid is recommended for testing the acceptability of this material for further storage and use as an oxidizer for rocket fuels. The method is both simple and rapid, and although it does not give precisely the absolute composition of the sample, it does indicate whether or not the composition of the sample is within an acceptable range. A set of curves of conductance vs temperature from 0 to 50°C is provided for fuming nitric acid in the composition range of 12 to 16 weight per cent nitrogen dioxide and 2.0 to 3.5 per cent water. Fuming nitric acid containing this amount of nitrogen dioxide and water possesses high thermal stability and therefore develops low storage pressures. Fuming nitric acid in this composition range is assumed to be usable with a given rocket fuel. A minimum of 0.3 weight per cent hydrofluoric acid in fuming nitric acid is recommended to inhibit liquid and gas-phase corrosion of conventional 55-gallon aluminum or stainless-steel storage drums during prolonged storage periods. Fuming nitric acid containing at least this amount of hydrofluoric acid is storable with respect to corrosion. A colorimetric test employing the bleaching effect of fluoride ion on a purple solution of ferric salicylate is described for checking semi-quantitatively the hydrofluoric acid present. (Author)

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
STORABILITY OF FUMING NITRIC ACID, by David M. Mason, Lois L. Taylor, and Howard F. Keller. Rept. on Contract DA 04-495-ORD-18. 28 Dec 53, declassified 12 Apr 54. 108p. 38 refs. Rept. no. 20-72.
Order from LC mi$5.70, ph$16.80 PB 153 949

This report released for sale to the public 2 Feb 61.

Some of the general problems of storing fuming nitric acid (the system HNO_3-NO_2-H_2O) in closed metal containers for periods of the order of 1 month at 130 and 160°F were investigated. Two chemical processes which cause problems in the storage of this widely used oxidant were specifically studied: (1) the corrosion of aluminum (types 61S-T6, 2S-O, and 52S-O) alloys and steel (types 303, 347, 410, 19-9DL, and 4130) alloys with change in composition and contamination of the acid with metallic salts and (2) the thermal decomposition of acid lean in NO_2 and H_2O with accompanying high pressures and changes in composition of the oxidant. The rate of corrosion of metal containers (mainly Al 61S-T6), the maximum pressures developed during storage, and the change of composition of the FNA were measured, and the resulting data are presented in tabular and graphical form. Liquid-phase corrosion of the aluminum alloys tested and of stainless-steel alloys 303, 347, and 19-9DL is found to be markedly inhibited by the presence of suitable amounts of HF or NaF in the FNA. Corrosion of the other steel alloys tested was accelerated by HF in FNA.

Pennsylvania State U., University Park.
THE RATE OF DECOMPOSITION OF NITROSYL CHLORIDE IN SHOCK WAVES, by Bernhard Deklau and Howard B. Palmer. Rept. on Contract Nonr-1858(25). Feb 60, 32p. 27 refs. Proj. Squid Technical rept. PSU-5-P; AD-235 848.
Order from LC mi$3.00, ph$6.30 PB 153 173

Measurements were made of the rate of decomposition of nitrosyl chloride, ONCl, over the temperature range from 880° to 1350°K. Data were obtained in pure ONCl and in a series of Ar-ONCl mixtures ranging up to 1:20 ONCl-Ar. The room temperature extinction coefficients, ϵ, which were obtained were in good agreement with the literature. The variation of ϵ with temperature showed considerable scatter, but its behavior at wavelengths of 3850, 4360, and 5460 A was in general accord with expectations on the basis of room temperature results.

Leather and Textiles

Office of Technical Services, Dept. of Commerce, Washington, D. C.
QUARTERMASTER CORPS TEXTILE SERIES REPORTS (1942-1960). Nov 60, 6p. 104 refs. OTS Selective Bibliography SB-440.
Order from OTS $0.10 OTS SB-440

A bibliography of reports listed in the two OTS monthly abstract journals: U. S. Government Research Reports and Technical Translations.

Southern Research Inst., Birmingham, Ala.
DETERIORATION OF TEXTILE MATERIALS BY ULTRAVIOLET LIGHT, by William S. Wilcox, Charles V. Stephenson and others. Rept. for 1 May 59-31 July 60 on Air Force Textile Materials, Contract AF 33(616)6565. Oct 60, 160p. 49 refs. Wadd Technical rept. 60-510.
Order from OTS $3.00 PB 171 417

The effects of ultraviolet radiation on polyethylene, Teflon, nylon, Mylar, and Acrilan were determined. These materials have been irradiated in a vacuum and in an inert atmosphere of nitrogen. Deterioration of these materials is faster for irradiation with short wavelength ultraviolet than it is for long wavelength radiation. Deterioration of polyethylene, nylon, Mylar, and Acrilan is faster in a nitrogen atmosphere than it is in a vacuum. However, Teflon deteriorates faster in a vacuum. Experimental evidence as to the processes of deterioration are discussed and mechanisms are proposed by which deterioration could take place. (Author)

MATHEMATICS

Aarhus U. (Denmark).
THE DETERMINANTS OF THE TOEPLITZ MATRICES OF AN ARBITRARY LAURENT POLYNOMIAL, by Palle Schmidt. Technical scientific note no. 4 on Contract AF 61(052)42. 20 Aug 60, 23p. 3 refs. AFOSR-TN-60-1383; AD-246 963.
Order from LC mi$2.70, ph$4.80 PB 153 305

Determinants $|T(n,p)|$, $n=1,2,\ldots$, $p=0,\pm1,\pm2,\ldots$, of Toeplitz matrices of the type $T(n,p)=|a_{p+i-j}|$, $i,j=1,2,\ldots,n$, $a_0=1$, $a_\nu=0$ for $\nu<0$, are studied. A relation is found reducing the case $p>1$ to the case $p=1$. By means of this the determinants of the Toeplitz matrices of a given Laurent polynomial $f(z)$ are expressed explicitly in terms of the zeros of $f(z)$. This is applied to determine the asymptotic behavior of such determinants. (Author)

Aeronautical Research Labs., Air Force Research Div., Wright-Patterson AFB, Ohio.
SOME APPLICATIONS OF THE POISSON DISTRIBUTION, by Z. N. Loh. Rept. on Research on Particle Dynamics. Aug 60, 30p. 15 refs. ARL Technical note 60-119; AD-246 334.
Order from LC mi$2.70, ph$4.80 PB 153 385

This report gives a brief summary of the formula and use of the Poisson Distribution. The introductory remarks are concerned with the meaning of the stochastic processes as a model of statistical processes and the special aspects of these devices. The poisson distribution $P(n)=\frac{e^{-t}t^n}{n!}$ is known as an approximate exponential function which expresses the probability of random rare events. It also can be derived as the limiting case of the binomial distribution. In the tables, numerical values were calculated for small values of n and t, and graphs were drawn by connecting the points corresponding to the small values of t for specific values of n. The smooth curves show the approximations. The use of the Poisson Distribution function is illustrated in special examples, namely, light emission or absorption, and in connection with the theory of cosmic ray showers. (Author)

Applied Mathematics and Statistics Labs., Stanford U., Calif.
APPLICATIONS AND EXTENSIONS OF THE METHOD OF WIENER AND HOPF FOR THE SOLUTION OF SINGULAR AND NON-SINGULAR INTEGRAL AND INTEGRO-DIFFERENTIAL EQUATIONS, by D. W. Swann. Technical rept. no. 87 on Contract Nonr-225(11). 20 Apr 60, 158p. 22 refs. AD-236 205.
Order from LC mi$7.50, ph$24.30 PB 147 121

Columbia U., New York.
A MULTIDIMENSIONAL GENERALISATION OF THE INVERSE SINE FUNCTION, by Harold Ruben. Rept. on Contract Nonr-266(59). [1960] 12p. 10 refs. CU-15-60-Nonr-266(59) MS; AD-233 862.
Order from LC mi$2.40, ph$3.30 PB 153 754

A class of functions, defined as integrals over unit hypercubes, which constitute natural generalisations of the inverse sine function is discussed. In the case where the unit cube is a square, the corresponding integral serves to define the latter function. The measure of a regular simplex in hyperspherical space may be expressed as a linear combination of such integrals. The simplicity of the integrals gives some grounds for progress in the difficult problem of evaluating the measures of regular hyperspherical simplices. (Author)

Hebrew U. (Israel).
LOCAL PARTIAL DIFFERENTIAL ALGEBRA, by S. Halfin and A. Robinson. Technical (scientific) note no. 12 on Contract AF 61(052)187. Oct 60, 21p. 3 refs. AFOSR-TN-60-1407; AD-246 977.
Order from LC mi$2.70, ph$4.80 PB 153 308

An algebraic theory for the solution of initial value problems for systems of algebraic differential equations has been given previously. The present paper extends the theory to systems of partial differential equations. (Author)

Hebrew U. (Israel).
RESEARCH IN THE AREA OF MATHEMATICAL ANALYSIS, by S. Agmon, A. Dvoretzky, and A. Robinson. Technical (final) rept. for 1 Nov 58-30 Sep 60 on Contract AF 61(052)187. Oct 60, 35p. 3 refs. AFOSR-TR-60-169; AD-246 976.
Order from LC mi$3.00, ph$6.30 PB 153 306

Contents:
Elliptic partial differential equations and related boundary value problems
Rearrangement of series; comparison of densities of sequences
Initial value problems and differential algebra
Univalent functions
Tauberian theorems and summability
The Bergman kernel
(See also PB 146 099)

Minnesota U., Minneapolis.
AN IMBEDDING OF CLOSED RIEMANN SURFACES IN EUCLIDEAN SPACE, by Adriano M. Garsia. Rept. on Contract AF 49(638)857. [1960] 31p. 15 refs. AFOSR-TN-60-1266.
Order from LC mi$3.00, ph$6.30 PB 153 433

The following theorem is proved: Every compact Riemann surface has a conformally equivalent C^∞ smooth model in 3-dimensional Euclidean space. (Author)

Carnegie Inst. of Tech. Graduate School of Industrial Administration, Pittsburgh, Pa.
OPTIMAL PROPERTIES OF EXPONENTIALLY WEIGHTED FORECASTS OF TIME SERIES WITH PERMANENT AND TRANSITORY COMPONENTS, by John F. Muth. ONR Research memo. no. 64 on Planning and Control of Industrial Operations, Contract [Nonr-760(01)]. May 59, 16p. 9 refs.
Order from LC mi$2.40, ph$3.30 PB 150 714

The object of this paper is to show that the exponentially weighted forecast is optimal if the time series to be predicted is composed of two kinds of random components: one lasting a single time period, and the other lasting through all subsequent periods. These are called, respectively, the transitory and permanent components of the time series.

North Carolina U. [Chapel Hill]
GENERALIZATION OF SOME RESULTS FOR INVERSION OF PARTITIONED MATRICES, by B. G. Greenberg and A. E. Sarhan. Technical rept. no. 7 on Estimation of Parameters by Order Statistics, Contract DA 36-034-ORD-2184. 12 Mar 59, 18p. 2 refs. OOR rept. no. 1597.10M; AD-212 194.
Order from LC mi$2.40, ph$3.30 PB 150 711

The present paper extends some of the findings about partitioning previously reported and now all of the observations reported (Biometrika, v. 43, June 56, p. 227-231) can be generalized.

Parke Mathematical Labs., Inc., Carlisle, Mass.
FOUNDATIONS FOR A GENERAL THEORY OF BOOLEAN FORMULAS, by John A. Riley. Scientific rept. no. 3 on Contract AF 19(604)3471. July 60, 105p. 40 refs. AFCRL-TN-60-970; AD-247 315.
Order from LC mi$5.70, ph$16.80 PB 153 458

The techniques of universal algebra are used to define and study the algebra of Boolean formulas. The main topics treated are: substitution operators, theory of essential letters, simplification operators, and the Quine-Samson theory of prime implicants. (Author)

RIAS, Baltimore, Md.
EXISTENCE OF A BOUNDED SOLUTION AND EXISTENCE OF A PERIODIC SOLUTION OF THE DIFFERENTIAL EQUATION OF THE SECOND ORDER, by T. Yoshizawa. Rept. on Contract AF 49(638)382. [1960] 17p. 2 refs. Technical rept. 60-18; AFOSR-TN-60-1064; AD-247 233.
Order from LC mi$2.40, ph$3.30 PB 153 414

This paper considers a differential equation of the second order $x'' = F(t,x,x')$, where $F(t,x,x')$ is periodic of t. Massera has proved that if all the solutions exist in the future and if one of them is bounded in the future, then a periodic solution exists. In this paper the existence of a bounded solution is discussed and applied to the existence of a periodic solution.

RIAS, Baltimore, Md.
LOCAL LINEAR DEPENDENCE AND THE VANISHING OF THE WRONSKIAN, by Gary H. Meisters. Rept. on Contract AF 49(638)382. Nov 60, 26p. 16 refs. Technical rept. 60-22; AFOSR-TN-60-1213.
Order from LC mi$2.70, ph$4.80 PB 153 711

RIAS [Baltimore, Md.]
REVERSIBLE TRANSFORMATIONS, by Daniel C. Lewis, Jr. Rept. on Contract AF 49(638)382. [1960] 13p. 6 refs. Technical rept. 60-16; AFOSR TN-60-1035; AD-247 231.
Order from LC mi$2.40, ph$3.30 PB 153 412

Syracuse U., N. Y.
PROBABILISTIC METHODS IN MARKOV CHAINS, by K. L. Chung. Research rept. no. 27 on Contract AF 49(638)265. Oct 60, 35p. 9 refs. AFOSR-TN-60-1243; AD-247 241.
Order from LC mi$3.00, ph$6.30 PB 153 358

It is the main purpose of this paper to show, by various illustrations from recent work, that the structure of the transition matrix on the one hand, and the behavior of the sample functions on the other, are so intimately connected that one can hardly strike a chord in the one without bringing out an echo from the other. The two sides of the theory of Markov chains induce, sustain, and complement each other. (Author)

Syracuse U., N. Y.
SOME REMARKS ON TABOO PROBABILITIES, by K. L. Chung. Research rept. no. 30 on Contract AF 49(638)265. Oct 60, 9p. 3 refs. AFOSR-TN-60-1244; AD-247 242.
Order from LC mi$1.80, ph$1.80 PB 153 359

Washington U., Seattle.
INTERSECTION IN CARTESIAN PRODUCTS, by Earnest Michael. Technical rept. no. 7 on Contract Nonr-477(21). Mar 60, 6p. 2 refs. AD-235 581.
Order from LC mi$1.80, ph$1.80 PB 153 685

The following theorem is proved: Let X be the product of X_I, $I \in A$, where each X_I is a topological space containing a dense subset of cardinality $\leqq U$. Let V be a collection of cubes in X such that, for all $J \in V$, every J_α is open and $|A_J| \leqq P$, $P \leqq J$. If every point of X is in $\leqq W$ sets $J \in V$, then $|V| \leqq (UW)^P$. U, P, and W denote cardinality.

Washington U., Seattle.
WEAK SEPARABILITY OF PRODUCT SPACES, by E. Michael. Technical rept. no. 6 on Contract Nonr-477(21). Mar 60, 8p. 3 refs. AD-234 938.
Order from LC mi$1.80, ph$1.80 PB 153 684

The following results are proved: (1) Any cartesian product of $\mathfrak{L}$-spaces is a $\mathfrak{L}$-space, and (2) Any cartesian product of separable metric spaces is a $\mathfrak{L}$-space. (Author)

Wayne State U., Detroit, Mich.
TESTS FOR THE VALIDITY OF THE ASSUMPTION THAT THE UNDERLYING DISTRIBUTION OF LIFE IS EXPONENTIAL, by Benjamin Epstein. Technical rept. no. 5 on Statistical Techniques in Life Testing, Contract Nonr-2163(00). 2 Apr 59, 83p. 31 refs.
Order from LC mi$4.80, ph$13.80 PB 150 725

This paper gives a variety of procedures for testing, on the basis of life test data, whether there are significant departures from an exponential distribution of life. The particular procedures that one should adopt depend on the class of alternatives one is testing against. A number of the tests are based in an essential way on fundamental properties of Poisson processes. Questions involving choice of tests are considered, and a number of examples are worked out (Author)

Wisconsin U., Madison.
TOPICS IN MATHEMATICS BASIC FOR PHYSICS AND ENGINEERING. II: THE LEBESGUE INTEGRAL (LECTURE NOTES), by J. Korevaar. Rept. on Contract N7onr-285(07). Apr 59, 104p. 34 refs. AD-225 106.
Order from LC mi$5.70, ph$16.80 PB 150 061

Computing Devices

Army Signal Research and Development Lab., Fort Monmouth, N. J.
PROGRAMMING STUDY OF A DIGITAL COMPUTER FOR PROCESSING THE UNICOM MESSAGE HEADING, by Horst E. Ulfers. 1 June 60, 34p. 1 ref. USASRDL Technical rept. 2115; AD-246 076.
Order from LC mi$3.00, ph$6.30 PB 153 002

The feasibility of employing a commercial, general purpose digital computer for processing the message heading in UNICOM is studied. The Burrough's DATATRON 220 is used to execute a test program. The average processing time of a standard message heading is 10 ms. To serve more than a hundred subscribers within one second, it is necessary to use a faster computer. A fast, special purpose digital computer would have advantages over the DATATRON 220 due to its limited but more specific instructions. Furthermore, it should be able to handle binary or octal digit words. (Author)

Electronic Systems Lab., Mass. Inst. of Tech., Cambridge.
THE PULSED ANALOG SYSTEM FOR EVALUATING CORRELATION FUNCTIONS FOR RADAR, by C. Gordon Bell. Scientific rept. no. 1 on Contract AF 19(604)6654 and Engineering rept. on Project HYVIA, Contract AF 33(616)6046. 9 Aug 60, 25p. 7 refs. 8494-R-1; 7976-60-5; AFCRL-TN-60-963.
Order from LC mi$2.70, ph$4.80 PB 153 560

Because of the finite width of the antenna pattern, scanning radars generate a number of pulse echoes from the same target, and data processing is required to determine the correct target azimuth for each group of echoes, or "blip." This processing is complicated by pulse-to-pulse noise. Cross-correlation with the antenna gain pattern or other filters appears advantageous for improved azimuth location of the target but has not been widely used because of the computational speed required. This report describes an experimental study of a pulsed-analog correlator simulated by operating the TX-0 computer with associated time-shared analog computing elements under digital program control. With each analog operation, such as multiplication, complete in 10 μsec (within the 12-μsec TX-0 instruction time) a 65-point cross-correlation between 100 data points and a 35-point filter function was completed in 4.83 milliseconds--about twice the time represented by the data points. Suggestions are given for construction of a pulsed-analog correlator which would operate on radar data in real time. (Author)

International Business Machines Corp., Yorktown Heights, N. Y.
COMPUTER SET AN/GSQ-16 (XW-1). VOLUME VII: THE LEXICAL BUFFER. Final rept. on Contract AF 30(602)1823. 9 Feb 60, 246p. RADC-TR-59-11OG; AD-235 064.
Order from LC mi$11.10, ph$37.80 PB 150 086-7

High-speed recording or printing of the translated output from the AN/GSQ-16(XW-1) is achieved by means of the speed-matching capabilities of the lexical buffer core memory with its associated components and circuitry. This unit provides great adaptability for the translator with respect either to input or output and frees the translator to operate for the first time at its full speed capability. The five principal components of the system are described along with their functional characteristics, including detailed circuit and logic design. The report contains a comprehensive maintenance and operating manual for the buffer memory, output control unit and power supply, along with the present flexowriter output and the rented IBM Model 11 tape unit. (Author)

International Business Machines Corp., Yorktown Heights, N. Y.
COMPUTER SET AN/GSQ-16 (XW-1). VOLUME VIII: LEXICAL BUFFER LOGIC DIAGRAMS, by M. Kloomok, P. W. Case and H. H. Graff. Final rept. on Contract AF 30(602)1823. 9 Feb 60, 285p. RADC-TR-59-11OH; AD-235 065.
Order from LC mi$11.10, ph$44.10 PB 150 086-8

Contents:
Preparation and interpretation of system logic diagram
System logic diagrams
Lexical buffer memory logic
Tape control unit logic
Flexowriter control unit logic
Search logic
(See also PB 150 086-7)

International Business Machines Corp., Yorktown Heights, N. Y.
COMPUTER SET AN/GSQ-16 (XW-1). VOLUME IX: LEXICAL BUFFER SCHEMATICS. Final rept. on Contract AF 30(602)1823. 9 Feb 60, 172p. RADC-TR-59-110I; AD-235 066.
Order from LC mi$8.10, ph$27.30 PB150 086-9

(See also PB 150 086-8)

Lincoln Lab., Mass. Inst. of Tech., Lexington.
INFORMATION PROCESSING. Quarterly progress rept. for 15 June-15 Sep 60 on Contract AF 19(604)7400. 15 Sep 60, 58p. 11 refs. AFCCDD TN-60-1020.
Order from LC mi$3.60, ph$9.30 PB 153 361

Contents:
Digital computers
Data processing
Computer components
Pattern recognition
Analysis
Psychology
(See also PB 150 602)

Melpar, Inc., Falls Church, Va.
VOICE DATA PROCESSING SYSTEM, by L. P. Schoene, Jr. Scientific rept. no. 2 on Contract AF 19(604)5579. 15 Sep 60, 67p. 1 ref. AFCRL-TN-60-1114.
Order from LC mi$3.90, ph$10.80 PB 153 455

The results of two feasibility studies in connection with modifying the design of the Voice Data Processing System to provide additional processing functions are presented. One of these studies is concerned with the provision of the capability for comparing spectrum pattern descriptions to detect approximate matches between input and stored descriptions. The other study concerns the provision of a capability for coding patterns in clusters. (Author) (See also PB 144 797)

Skiatron Electronics and Television Corp., New York.
RESEARCH ON HIGH-DENSITY DIGITAL STORAGE IN PHOSPHORS. Final rept. on Contract AF 19(604)4990. 15 July 60, 153p. Rept. no. 201A-205; ERD-TR-60-170; AD-245 926.
Order from LC mi$7.50, ph$24.30 PB 152 928

This project was to determine basic limitations of packing density and operating speed, and to initiate effort toward providing an optimum dark trace tube specifically designed for high density digital storage. A digital technique for accurate beam repositioning was also conceived and is described. A redesigned triggering and control chassis, and an improved pulse discriminator circuit for PEC readout, resulted in a very versatile and efficient test set up for the evaluation of special dark trace tubes, and the consideration of different operating parameters. Special tubes included a CRT with: (1) various thicknesses of KCl, (2) no carbon and/or aluminum backing, (3) a collector ring to facilitate evaluation of secondary emission readout, and (4) an experimental tube which represented an initial attempt at depositing another phosphor over the KCl alkali halide layer. Improved gun structures, and an effective dual phosphor dark trace tube, appear to offer best promise for substantial improvements in storage capacity and readout speed. (Author)

Stanford Research Inst., Menlo Park, Calif.
RESEARCH ON GENERAL DIGITAL LOGIC SYSTEMS UTILIZING MAGNETIC ELEMENTS AND WIRE ONLY, by E. K. Van De Riet, and C. H. Heckler, Jr. Final rept. on Contract AF 19(604)4509. Oct 60, 78p. 11 refs. SRI Proj. 2925; AFCRL-TR-60-352; AD-246 315.
Order from LC mi$4.50, ph$12.30 PB 153 206

A machine was designed to prove the feasibility of all-magnetic logic systems. All of the circuits except input, output, and pulse power supply were built exclusively of ferrite magnetic elements and copper conductors. The machine described here is an arithmetic element which performs addition, subtraction, and multiplication with three-digit decimal numbers. It carried out all operations correctly with a simultaneous variation of ±10 percent on all drive pulse amplitudes. Input is through a keyboard and output is in the form of indicator lights. A laboratory pulser was used to supply the clock pulses. Recommendations are made for increased effort toward developing new ideas and carrying on a machine building program with sufficient continuity to keep up with the other phases of development. An evaluation of additional all-magnetic logic techniques is made. (Author)

MECHANICS

Brown U. Div. of Applied Mathematics, Providence, R. I.
AXIAL PLASTIC FLOW BETWEEN NON-CIRCULAR CYLINDERS, by V. V. Sokolovsky. Technical rept. no. 58 on Contract Nonr-562(10). Arp 60, 15p. C11-58; AD-236 728.
Order from LC mi$2.40, ph$3.30 PB 147 401

Trans. of paper presented at Symposium on Naval Structural Mechanics no. 2, Brown U., 5-7 Apr 61.

The axial flow of a plastic mass in the doubly connected space between two rough cylindrical surfaces with non-circular cross sections and parallel generators is presented. A method is developed that reduces the solution of the problem for a non-linear constitutive equation to that of the same problem for a linear constitutive equation. The axial flow between cylindrical surfaces with confocal elliptical cross sections is treated as an example. (Author)

Brown U. Div. of Engineering, Providence, R. I.
EXTENSION OF THE STABILITY POSTULATE WITH EMPHASIS ON TEMPERATURE CHANGES, by D. C. Drucker. Technical rept. no. 17 on Contract Nonr-562(20). Apr 60, 26p. 9 refs. Nonr-562(20)17; AD-236 500.
Order from LC mi$2.70, ph$4.80 PB 147 362

A definition of stability of a body of material under isothermal conditions was phrased in terms of an external agency which can apply any set of forces to the body. Positive work by each of the sets of forces of the external agency on the change in displacements produced insures stability. The proposal is made that the external agency be thought of as applying other environmental forces with accompanying changes in displacement. If temperature change is considered as a force the corresponding change in displacement is the change in the flow of entropy into the body. Attention is devoted to such specialized topics as adiabatic yield surfaces in plasticity and variation of yield stress with temperature. Consideration is given also to the reasonableness of the postulate and to its position in the laws of thermodynamics. One conclusion is that it is necessary to use uncoupled thermal and stress equations in plasticity theory when the yield stress decreases with temperature. (Author)

Columbia U., New York.
FREE EXTENSIONAL TORSIONAL VIBRATIONS OF A PROLATE SPHEROIDAL SHELL, by F. L. DiMaggio and A. Silbiger. Technical rept. no. 2 on Contract Nonr-266(67). Mar 60, 10p. 4 refs. CU-1-60-ONR(67)-CE; AD-235 391.
Order from LC mi$1.80, ph$1.80 PB 153 734

Torsional vibrations in vacuo of thin shells in the shape of prolate spheroids are investigated to determine the effect of end geometry. The differential equation for the mode shapes obtained by application of Hamilton's principle in prolate spheroidal coordinates, is found to be satisfied by single tabulated prolate spheroidal angle functions of the first kind and the transcendental frequency equation is readily solved with the aid of the tabulated eigenvalues. Numerical non-dimensional results are presented for the first eight modes.

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
ANALYSIS OF STRESS DISTRIBUTION ON THE HYPERBOLIC PARABOLOIDAL SHELL, by Julian L. Davis. Dec 60, 22p. 5 refs. Technical rept. FRL-TR-22.
Order from LC mi$2.70, ph$4.80 PB 153 386

A mathematical analysis of the stress distribution on a hyperbolic paraboloidal shell for certain boundary conditions is presented starting from first principles. The geometry of the hyperbolic paraboloidal surface is described. The equilibrium equations are developed under the conditions of membrane theory, and the stress distribution is determined. Special cases are given. This study stems from the need of the design engineer for a better understanding of the basic principles underlying the elastic behavior of the hyperbolic paraboloidal shell in certain military applications. (Author)

Illinois U. [Urbana].
ANNOTATED BIBLIOGRAPHY AND SELECTED REFERENCES ON THE THEORY OF ELASTIC PLATES, by P. E. Wilson and A. P. Boresi. Technical rept. no. 5 on Contract [No]nr-1834(14). Jan 60, 23p. 19 refs. T.&A.M. rept. no. 158; AD-234 250.
Order from OTS $0.75 PB 171 374

Particular emphasis has been placed on those theories which include one or more of the following effects. (1) Nonlinear effects in the strain-displacement relations; (2) Transverse shear stress; (3) Transverse normal stress; (4) Anisotropy; (5) Heating; (6) Nonhomogeneity (Sandwich plates); (7) Viscoelasticity.

Illinois U. [Urbana]
STRAIN ENERGY EXPRESSION FOR A CIRCULAR CYLINDRICAL SHELL INCLUDING TRANSVERSE SHEAR EFFECTS, by R. E. Miller and A. P. Boresi. Technical rept. no. 6 on Contract [Nonr]-1834(14). Feb 60, 30p. 6 refs. T. & A. M. rept. no. 159.
Order from LC mi$2.70, ph$4.80 PB 153 119

In problems of buckling and of post-buckling behavior of circular cylindrical shells, restrictive assumptions which reduce the three-dimensional elasticity problem to a two-dimensional problem are usually employed. However, in modern structural problems of moderately thin shells, the effects of transverse shear may be important. The strain energy expression derived in this report is based on the exact expressions for the strain-displacement relations of three-dimensional elasticity theory.

Lockheed Aircraft Corp., Sunnyvale, Calif.
STRUCTURAL RELIABILITY METHODS FOR CYLINDERS AND CONES, by G. W. Reed and E. J. Pipes. Technical memo. [on Contract Nord-17017]. May 59, 48p. 10 refs. LMSD-4507.
Order from LC mi$3.30, ph$7.80 PB 153 357

This report released for sale to the public 1 Feb 61.

Empirical design curves based on probability theory are developed in this report for cylinders and cones under external pressure. The method of analysis is recommended for strength analysis where a level of structural reliability must be established. (Author)

Purdue U. Div. of Engineering Sciences, Lafayette, Ind.
PROPAGATIONS OF ELASTIC WAVES GENERATED BY DYNAMICAL LOADS ON A CIRCULAR CAVITY, by A. Cemal Eringen. Technical rept. no. 16 on Contract Nonr-1100(02). Jan 60, 18p. 15 refs. AD-231 875.
Order from LC mi$2.40, ph$3.30 PB 152 904

The Fourier transform technique was employed to solve the exterior elasto-dynamic problem concerning the region outside a circular cavity in a plane elastic body. The normal and tangential tractions acting at the surface of the circular cavity are prescribed as arbitrary functions of the polar angle, θ, and the time, t. The case of impact, blast, and moving loads are studied in detail. (Author)

Rensselaer Polytechnic Inst., Troy, N. Y.
VIBRATIONS OF ROTATING BEAMS WITH TIP MASS, by William E. Boyce and George H. Handelman Rept. on Contract AF 18(600)1586. 30 Nov 60, 36p. 8 refs. RPI MathRep. no. 39; AFOSR-TN-60-1402.
Order from LC mi$3.00, ph$6.30 PB 153 501

The purpose of this investigation is an attempt to analyze the effect of a tip mass on frequencies higher than the first. (Author)

Aerodynamics and Pneumatics

Aeroelastic and Structures Research Lab., Mass. Inst. of Tech., Cambridge.
TRANSIENT AND NONLINEAR EFFECTS ON HIGH SPEED, VIBRATORY THERMOELASTIC INSTABILITY PHENOMENA. PART I: THEORETICAL CONSIDERATIONS, by Eugene J. Brunelle, Jr. Rept. for 15 Jan 59-May 60 on Dynamic Problems in Flight Vehicles, Contract AF 33(616)6185. July 60, 125p. 17 refs. WADD-TR-60-484, Part I.
Order from OTS $2.75 PB 171 415

This report presents an engineering approach to the one and two degree of freedom study of both linear differential equations with time-varying coefficients and autonomous differential equations with constant coefficients containing weak non-linearities. Approximate solutions of varying complexity and hence accuracy are presented for these equations and the results are qualitatively compared. In order to provide a convenient reference analysis for assessing aeroelastic examples of time-varying and nonlinear system behavior, a portion of this report is devoted to presenting the general features of a constant coefficient aeroelastic process in a nonclassical manner. (Author)

Arnold Engineering Development Center [Tullahoma, Tenn.]
COMPRESSIBLE FLOW TABLES FOR GASES WITH SPECIFIC HEAT RATIOS FROM 1.10 TO 1.28, by K. E. Tempelmeyer and G. H. Sheraden. Rept. on ARO, Inc., Contract AF 40(600)700 Sup. 6(58-1). Mar 58, 172p. 18 refs. AEDC TN-58-9; AD-152 041.
Order from LC mi$8.10, ph$27.30 PB 153 477

This report released for sale to the public 15 Feb 61.

Some of the publications containing documentation of compressible flow functions are reviewed to indicate their area of application and range. The more frequently used one-dimensional isentropic, normal shock and expansion flow relationships are presented for a Mach number range from 0.02 to 8.00 and specific heat ratios from 1.10 to 1.28 in intervals of 0.02 (Author)

Avco [Everett] Research Lab. [Mass.]
RADIATION FROM HOT AIR, by J. Keck, J. Camm and others. Rept. on Contract AF 04(647)278. Feb 59, 65p. 35 refs. Research rept. 42; AD-213 643.
Order from LC mi$3.90, ph$10.80 PB 149 676

The radiation emitted by shock-heated oxygen, nitrogen and air was studied in the wavelength range 2000 to 10,000Å at temperatures from 4000 to 9000°K and densities from .01 to 10 times standard atmospheric. Both spectroscopic and photometric techniques were employed. The radiation consists of bands from O_2, N_2, N_2^+ and NO molecules, lines from O and N atoms and continuum Kramers radiation from O^-. Comparison of the experimental results with the theoretical expressions giving the wavelength, temperature and density dependence of the radiation gave electronic f-numbers for all the bands observed.

Ballistic Research Labs., Aberdeen Proving Ground, Md.
THE DRAG AND STABILITY OF A CIRCULAR WEDGE AIRFOIL IN SUPERSONIC FLIGHT, by Maynard J. Piddington and Charles H. Murphy. Jan 60, 19p. 3 refs. Memo. rept. no. 1245; AD-234 865.
Order from LC mi$2.40, ph$3.30 PB 150 069

The drag and stability characteristics of circular wedge airfoils are presented and discussed. Although linear analysis predicts neutral static stability, these airfoils were adequately stable for Mach numbers greater than 1.8. At lower Mach numbers the drag increased quite rapidly and the models tumbled. (Author)

Ballistic Research Labs., Aberdeen Proving Ground, Md.
MINIATURE HOT WIRE PRESSURE GAGES FOR WIND TUNNEL WORK, by Herbert J. Bomelburg. Jan 60, 18p. 3 refs. Rept. no. 1095; AD-235 058.
Order from LC mi$2.40, ph$3.30 PB 150 067

A Pirani type hot wire pressure gage is described, which, because of its small size; can be installed within the usual pressure holes of wind tunnel models. Its expected temperature drift was compensated and static and pitot pressures were measured. As the response time of such a small gage is very short, it can also be used for indicating unsteady and turbulent flow conditions. Two symmetrical gages of this kind were used as a sensitive flow angle meter. (Author)

Computer Engineering Associates, Inc., Pasadena, Calif.
THE EFFECTS OF TIME VARYING AERODYNAMIC COEFFICIENTS ON AEROELASTIC RESPONSE, by Richard H. MacNeal, Jack H. Hill and Bernard Mazelsky. Rept. for 16 Feb 59-28 Apr 60 on Dynamic Problems in Flight Vehicles, Contract AF 33(616)6221 Apr 60, 109p. 13 refs. WADD Technical rept. 60-390.
Order from OTS $2.50 PB 171 407

An investigation was made of the effects of time-varying aerodynamic coefficients on the flexure-torsion flutter problem during rapidly accelerated vertical flight. These effects are likely to be significant in the transonic flight regime of a rocket-boosted vehicle. A mathematical analysis of systems of linear differential equations with slowly varying coefficients is presented. Simplified approximate solutions are derived from this analysis. An analog computer investigation of a lifting surface with pitch and plunge degrees

of freedom and time-varying aerodynamic coefficients is described in which the free transient response and the response to continuous excitation were measured for a variety of parameter configurations. These results are compared with response envelopes predicted by a simplified analytical method and the agreement is found to be satisfactory. (Author)

Cornell U. Graduate School of Aeronautical Engineering, Ithaca, N. Y.
THEORY OF LINEARIZED TIME-DEPENDENT BOUNDARY LAYERS, by S. H. Lam and N. Rott. Final rept. on Contract AF 49(638)544. July 60, 55p. 9 refs. AFOSR-TN-60-1100; AD-246 519.
Order from LC mi$3.60, ph$9.30 PB 153 092

A class of laminar, two-dimensional, time-dependent, incompressible, boundary-layer flows is considered. The major goal of the present investigation is to resolve certain mathematical peculiarities of this category of unsteady, flat-plate flows, but most of the analysis is not restricted to the flat plate. The question of the joining of the low-frequency and high-frequency series solutions is given special attention. Extensive numerical computations, performed to substantiate the theory, are also presented here.

Institute for System Research, U. of Chicago, Ill.
DETERMINING AIR REACTIONS ON MOVING VEHICLES. PART IV. METHODS OF AERODYNAMICS: ELEMENTARY BODIES, by M. Z. Krzywoblocki. Rept. on Contract AF 33(616)5689. Aug 60, 946p. 1,683 refs. WADC Technical rept. 56-51, Part IV.
Order from OTS $10.00 PB 171 387

This report describes the methods of aerodynamics which are mainly concerned with the flow of a viscous gas and the drag due to viscosity in continuum, as well as with the flow of a highly rarefied gas in the high altitude domain where the notion of continuum is no longer valid. Accordingly, its contents are divided into four sections: Section I describes methods based upon the aerodynamics of continuum applied to the flows of viscous fluids. Its particular concern is with the phenomena in the boundary layer, the resistance of bodies in viscous fluids, and the heat exchange phenomena between the fluid and the moving body. Section II describes methods based upon the kinetic theory of gases applicable to the phenomena in rarefied gases to determine the friction drag of moving vehicles. Section III discusses the methods based upon the so-called Newtonian flow and free molecule theories, applied in particular to the calculation of the drag of a body moving in a highly rarefied gas domain and to the estimation of the heat transfer phenomena between the gaseous medium and the moving body. Section IV presents methods referring to magnetohydrodynamics, particularly to the calculation of the boundary layer in an electron stream, and to the similarity rules in magnetohydrodynamics. (Author) (See also PB 161 141)

Institute for System Research, U. of Chicago, Ill.
DETERMINING AIR REACTIONS ON MOVING VEHICLES. PART V. METHODS OF AERODYNAMICS - COMPOSITE BODIES, by M. Z. Krzywoblocki. Rept. on Contract AF 33(616)5689. Aug 60, 236p. 901 refs. WADC Technical rept. 56-51, Part V.
Order from OTS $3.50 PB 171 388

This report contains the methods used by aerodynamicists to determine the quasi-static forces acting on composite bodies moving in an airstream. Included in the volume are the methods for arriving at the quasi-static force picture for complex body shapes whose elements are subject to interaction, interference effects, and deformation (movable control surfaces). (Author) (See also PB 171 387)

Lincoln Lab., Mass. Inst. of Tech., Lexington.
UHF RADAR FOR REENTRY PHYSICS PROGRAM, by B. G. Kuhn. Rept. on Contract AF 19(604)7400. 19 Sep 60, 77p. 21G-0011; AD-244 586.
Order from LC mi$4.50, ph$12.30 PB 152 620

Contents:
System Description: Major features; system functioning
Review of Components: Varian 812B klystron power amplifier; duplexer; directional coupler; waveguide and antenna system; RF drive system; klystron modulator; pulse transformer; high voltage power supply; trigger system and timing; safety interlock system; receiver
Test System: General; equipment and couplings; performance check sheet; test pictures
Equipment Layout and Cabling
Run-up Procedure
Discussion of Results

Lockheed Aircraft Corp., Sunnyvale, Calif.
THE EFFECT OF NONLINEAR AERODYNAMIC COEFFICIENTS ON FREE-SPINNING BALLISTIC BEHAVIOR AND ITS APPLICATION TO THE EVALUATION OF FLIGHT MEASUREMENTS, by J. S. Kanno. Technical rept. on Flight Sciences. June 60, 62p. LMSD-703013; AD-240 807.
Order from LC mi$3.90, ph$10.80 PB 152 844

An analysis is made to predict the effect of nonlinear aerodynamic characteristics on the free epicyclic motion of a free-spinning ballistic body and to determine certain nonlinear aerodynamic coefficients from flight-test motion records. The equations of motion are briefly developed subject to the restrictions of constant forward velocity, small normal and lateral translation displacements, constant axial spin, small pitch-yaw angular displacements, and constant dynamic pressure and Mach number to yield a sixth-order differential equation describing the motion as observed in body coordinates. The important equation for resolving an analytic solution is shown to be a second-order nonlinear homogeneous differential equation of the dependent variable, the complex-vector representation of the angle-of-attack. Based on the fundamental oscillatory motion of the harmonic ballistic portion of the equations with a reference "average" aerodynamic static stiffness coefficient, an approximate quasi-harmonic solution for the angle-of-attack is derived by averaging method of Kryloff and Bogoliuboff (K-B). From the K-B solution, it is concluded that the effects of aerodynamic normal force and damping moment influence the envelope of the motion independently of the influence of aerodynamic static moment upon the cyclic characteristics of the motion. Also, a change in space motion factor (except for $K = 0$ or ± 1) reflects nonlinear aerodynamic coefficients. With a monotonically softening static moment, the period for $K = 0$ is less

than the period for K= ±1. Conversely, with a hardening static moment, the period for K = 0 is greater than the period for K= ±1. Approximations of the K-B averaging integrals based on quadratic interpolation of the appropriate aerodynamic coefficients are developed for application to flight-test motion records.

Massachusetts Inst. of Tech., Cambridge.
HYPERSONIC FLOW PAST BLUNT BODIES AT SMALL ANGLES OF ATTACK, by Gerhard L. Gross. Rept. on Contract AF 49(638)207. Oct 60, 16 refs. Fluid Dynamic Research Group rept. no. 60-4; OSR Technical note no. 60-1195.
Order from LC mi$3.90, ph$10.80 PB 153 420

An analytical solution is derived for the flow in the nose region of blunt bodies of revolution with conic section profiles, traveling at hypersonic velocities and zero or small angles of attack. The approach chosen is that of linearization of the inviscid equations of motion in the angle of attack and the ratio of the density before to that behind the strong bow shock according to the modified Newtonian approximation. The density is assumed constant for the flow between shock and body surface. The possibility is discussed of a numerical extension into the neighborhood of Freeman's singularity, which does, however, not occur within finite distance from the axis for a paraboloid nose shape. (Author)

Michigan U., Ann Arbor.
SOME DETAILS OF THE TRANSITION TO TURBULENT FLOW IN POISEUILLE FLOW IN A TUBE, by A. M. Kuethe and K. R. Raman. Rept. on Contract AF 18(603)34. June 59, 36p. 13 refs. UMRI Proj. no. 2504; AFOSR TR-59-84; AD-232 746.
Order from LC mi$3.00, ph$6.30 PB 150 982

Measurements of velocity fluctuations, Reynolds stresses and shearing stresses at the wall in the transition region of a tube are presented. The measurements are made in a tube at a Reynolds number of 6000 behind 3 disturbance generators placed in the fully developed laminar flow 620 diameters from the entrance. The results show the way in which some of the statistical details of the transition depend on the nature of the disturbance generated. The Reynolds stresses and the shearing stress at the wall can reach very high values during the early stages of transition. Implications are pointed out regarding possible causes for the high temperature recovery factor during transition in high speed flow over surfaces. (Author)

Naval Ordnance Test Station, China Lake, Calif.
UNSTEADY SUPERSONIC FLOW PAST SLENDER POINTED BODIES, by John W. Miles. 11 May 53, 73p. 6 refs. NOTS 701; NAVORD rept. 2031.
Order from LC mi$4.50, ph$12.30 PB 154 403

This report released for sale to the public 16 Feb 61.

The equations of unsteady, supersonic flow in an ideal fluid are examined in the neighborhood of a very slender body, and an order analysis is carried out in terms of the fineness ratio, reduced frequency, and Mach number. Following Ward's analysis for the steady flow problem, a complex potential is then introduced and expanded near the body in powers (and a logarithm) of the complex variable in a plane transverse to the flow. Momentum balances are used to evaluate the drag, lift, and moments on the body. The results are used to determine the drag on an accelerating body of revolution and the logitudinal stability derivatives and damping in roll for low aspect ratio wings and slender wing-body combinations. (Author)

Naval Supersonic Lab., Mass. Inst. of Tech., Cambridge.
A BIMOLECULAR DIATOMIC GAS MODEL APPLIED TO NONEQUILIBRIUM BLUNT-BODY FLOW, by William John Towle. Aug 60, 76p. 31 refs. Technical rept. 462.
Order from LC mi$4.50, ph$12.30 PB 153 106

Derivation of the thermodynamic relations is presented for a bimolecular diatomic gas mixture from statistical thermodynamic considerations including vibrational and dissociational modes. A review and derivation of the reaction rate equation for the dissociational process is given. An approach for the solution of the flow field about a blunt body in hypersonic flow for the nonequilibrium dissociating gas is considered in detail. (Author)

Naval Supersonic Lab., Mass. Inst. of Tech., Cambridge.
A MASS TRANSFER FINITE DIFFERENCE FORMULATION EMPLOYING CROCCO VARIABLES, by James P. Moran and Paul B. Scott. Rept. on Contract AF 49(638)245. June 60, 81p. 11 refs. Technical rept. 443; AFOSR-TN-60-846. AD-247 913.
Order from LC mi$4.80, ph$13.80 PB 153 104

Solutions to the laminar boundary-layer equations have been obtained by Flügge-Lotz and Baxter using a finite difference formulation. The same difference approximations are used here to develop a formulation for the binary boundary-layer equations for the case of helium injection into an air stream. This formulation is used in obtaining solutions to the problem of a porous region having an injection function of the form $k/\sqrt{x_c}$. Corresponding solutions obtained by Moran using Covert's approximations to the equations are compared with the finite difference solutions. For low levels of injection Covert's approximations to the concentration and shear equations show good agreement with the finite difference solutions. (Author)

Polytechnic Inst. of Brooklyn, N. Y.
INTEGRAL METHOD COMPRESSIBLE BOUNDARY LAYER CALCULATIONS FOR STRONG FAVORABLE STREAMWISE PRESSURE GRADIENTS OVER AN INSULATED SURFACE, by Martin H. Steiger. Rept. on Aerodynamic and Heat Transfer Problems in Hypersonic Flow, Contract AF 33(616)6118. Sep 60, 21p. 5 refs. PIBAL rept. no. 621; ARL Technical note 60-149; AD-246 441.
Order from LC mi$2.70, ph$4.80 PB 153 184

The two-dimensional, laminar, compressible boundary layer with strong favorable pressure gradients are investigated. The main purpose of this note is to present

a method by which highly non-similar solution may be obtained regardless of the magnitude of this gradient. A well-behaved non-similar solution is obtained for the hypersonic flow about a two-dimensional blunt body with an insulated surface. (Author)

Polytechnic Inst. of Brooklyn, N. Y.
TABULATION OF COORDINATES FOR HYPERSONIC AXISYMMETRIC NOZZLES. PART II. COORDINATES FOR TEST SECTION MACH NUMBERS OF 6, 7, 8.5, 9, 10, 14, 16, AND 18, by Robert J. Cresci. Rept. on Wind Tunnel Studies, Contract AF 33(616)3978. July 60, 134p. PIBAL rept. no. 463; WADD Technical note 58-300, Part II; AD-240 666.
Order from LC mi$6.90, ph$21.30 PB 152 838

Nozzle contours are presented for test section Mach numbers of 6, 7, 8.5, 9, 10, 14, 16, and 18. These contours were obtained by applying the method of characteristics to the region between a spherical source flow and a uniform, parallel flow. The contours are given for various half-cone angles between 6^{o} and 20^{o}. (Author)

Rensselaer Polytechnic Inst., Troy, N. Y.
EFFECT OF SURFACE MASS-TRANSFER ON THE IMPULSIVE MOTION OF AN INFINITE PLATE AT HYPERSONIC SPEEDS IN A VISCOUS COMPRESSIBLE FLUID, by Ting Yi Li. Rept. on Contract AF 18(600)1591. Sep 60, 57p. 7 refs. TR AE 6005; AFOSR-TN-60-956; AD-246 621.
Order from LC mi$3.60, ph$9.30 PB 153 315

The effects are examined of mass-transfer on an infinite flat plate surface when the plate executes an impulsive motion at hypersonic speeds in a viscous compressible fluid. K. Stewartson (Cambridge Phil. Soc., 1955) has considered the corresponding problem for an impermeable surface. In the present paper, the law of surface mass-transfer which yields a similar solution for the viscous boundary layer is derived. The solution for the viscous region can be obtained by an extension of Stewartson's result. The matching at the interface between the viscous and inviscid regions is accomplished by Stewartson's procedure. Solutions are obtained in explicit closed forms which give complete information on the effects of surface mass-transfer on the strong interaction between shock wave and boundary layer. Numerical examples are discussed. (Author)

Rennselaer Polytechnic Inst., Troy, N. Y.
STUDY OF FLUID MIXING AND RELATED AERODYNAMIC PROBLEMS, by K. T. Yen. Final rept. on Contract AF 49(638)23. Sep 60, 12p. 15 refs. TR AE 6006; AFOSR-TR-60-136; AD-246 622.
Order from LC mi$2.40, ph$3.30 PB 153 261

Contents:
Indeterminateness of the mixing problem
The general mixing problems
Effects of jet mixing on the thrust generation of the jet flap
Boundary layer flows over a curved surface
Optimal coordinates for viscous flows
Magnetohydrodynamic boundary layer flows and jet mixing problems
Study of some supersonic rotational flow

Sferi-Coanda, Clichy (France).
STUDY OF A COANDA NOZZLE OPERATING AS A SINGLE EJECTOR. STUDY OF THE OPERATION OF COANDA NOZZLE WORKING IN STAGES. EXTRAPOLATION LAWS. Technical (final) rept. on Contract AF 61(052)158. Aug 59, 250p. AFOSR-TR-60-2; AD-230 385.
Order from LC mi$11.10, ph$37.80 PB 153 378

Contents:
Study of the single coanda nozzle working as an ejector, and its comparison with a direct ejector
General installation with pendular system
Tests at constant energy intake
Experimental data on direct ejector
Study of the coanda nozzle working as a compressor
Theoretical calculation of the possible backpressure at coanda nozzle exit
Determination of the geometrical characteristics of the coanda nozzle
Determination of the geometrical characteristics of the divergent
Theoretical considerations of nozzle set up in stages
The extrapolation laws
Nozzle 70/84; experimental data and results
Study of the extrapolation; experimental data and results
Conclusions; extrapolation laws

Hydrodynamics, Hydraulics, and Hydrostatics

Aeronautical Research Associates of Princeton, Inc., N. J.
EXAMINATION OF THE SOLUTIONS OF THE NAVIER-STOKES EQUATIONS FOR A CLASS OF THREE-DIMENSIONAL VORTICES. PART I: VELOCITY DISTRIBUTIONS FOR STEADY MOTION, by Coleman duP. Donaldson and Roger D. Sullivan. Rept. on Contract AF 49(638)255. Oct 60, 118p. 112 refs. AFOSR-TN-60-1227; AD-247 471.
Order from LC mi$6.00, ph$18.30 PB 153 459

A study has been made of the class of solutions of the Navier-Stokes equations wherein the radial, tangential, and axial velocities in cylindrical coordinates (r, θ, z) are of the forms $U = u(r)$, $v = v(r)$, and $w = z\bar{w}(r)$. These solutions are found to represent a rather large class of three-dimensional viscous vortex motions. The class of solutions contains Burger's analytic solution for an unconstrained one-celled vortex as a special limiting case. The solutions obtained show that vortex motions are possible which have more than one "cell". That is, the flow may not simply spiral in toward an axis and out along it as in a one-celled configuration but may have nested regions of successively reversed axial flow. The behavior of the solutions in passing from single to multiple-celled configurations is discussed and the solution for the extremely interesting case of a two-celled analogue to Burgers' unconstrained vortex, which probably occurs quite often in nature, is given in closed form. (Author)

Brown U. Div. of Applied Mathematics, Providence, R. I.
THE OSCILLATIONS OF A VISCOUS LIQUID DROP, by W. H. Reid. Technical rept. no. 32 on Contract Nonr-562(07). Feb 60, 7p. 3 refs; AD-232 752.
Order from LC mi$1.80, ph$1.80 PB 153 162

Microwave Lab., Stanford U., Calif.
THE STATISTICAL BASIS OF HYDRODYNAMICS AND KINETIC THEORY, by Lawrence William Davis. Doctoral thesis. Technical note on Contract AF 49(638)342. Oct 60, 90p. 43 refs. M. L. rept. no. 785; AFOSR-[TN] 60-1337; AD-247 590.
Order from LC mi$4.80, ph$13.80 PB 153 650

A formalism is developed in which problems of hydrodynamics and kinetic theory are treated as examples of statistical inference. Recent advances in probability theory and statistical techniques make possible this reformulation of these problems, the calculations now appearing as an application of statistical decision theory. Thus the prediction of some quantity, such as density, appears as a decision process in which is incorporated all of the available macroscopic information and which, subject to this constraint, makes that decision which minimizes the expected square of the error. (Author)

New York U. Coll. of Engineering, N. Y.
SOME NON-LINEAR PROPERTIES OF LONG CRESTED PERIODIC WAVES WITH LENGTHS NEAR 2.44 CENTIMETERS, by Willard J. Pierson, Jr. and Paul Fife (Stanford U.). Technical rept. on Contract Nonr-285(03). Feb 60, 33p. 12 refs. AD-236 215.
Order from LC mi$3.00, ph$6.30 PB 153 159

Formal perturbation procedures are applied to an analysis of periodic long crested waves. Classical perturbation methods yield wave forms for dominantly gravity or dominantly capillary waves that are in agreement with more exact non-linear theoretical results. These same procedures also yield special solutions at a denumerable set of wave numbers where the general formulas fall. The PLK (Poincare Lighthill Kuo) method yields, without using the full potential of the method, a realistic result for the values in question that reduces to the special classical solution at the bifurcation wave number. The results obtained suggest that the wave form for waves of a length greater than 2.44 cm will be like that of classical gravity waves over an extensive range of lengths and that only near lengths of 2.44 cm will the profile not look like the classical picture.

Wigley, C.
CALCULATION OF WAVE RESISTANCE AT LOW AND MODERATE SPEEDS, by C. Wigley. Rept. no. 2 on Contract N62558-1772. Apr 60, 62p. 6 refs. AD-236 263.
Order from LC mi$3.90, ph$10.80 PB 147 125

Dealing only with low and moderate speeds, all comparison was restricted to Froude Numbers less than 0.35 for which the trim and sinkage of the model are negligible, so that any changed distribution of speed round the form may be neglected. Calculations were made for 10 forms. For each form the arbitrary power n was taken as $n = 2$, and $n = 4$, so that the fundamental term in α and β was taken as e^{-A/N^2} and also as e^{-B/N^4}. For either power the work was done for a series of values of the arbitrary constants A or B embracing that value which gave the best agreement. (Author) (See also PB 146 294)

METALLURGY

Battelle Memorial Inst., Columbus, Ohio.
THERMOSTATIC BIMETALS FOR LOW TEMPERATURES, by H. R. Nelson, C. M. Schwartz and others. Final rept. on Contract W36-039-sc-32120. 20 May 49, 219p. 27 refs.
Order from LC mi$9.60, ph$33.30 PB 153 929

This report released for sale to the public 15 Feb 61

Contents:
Commercial contacts and experimental materials
Dilatometry
Elastic moduli and proportional limit determinations of bimetals and components
Load-deflection tests
Temperature-deflection tests
Miscellaneous studies of bimetals
Internal stress measurements of bimetals
Internal stresses in treated bimetals and components
Formation of bimetals by unusual methods

Defense Metals Information Center, Battelle Memorial Inst., Columbus, Ohio.
MELTING AND CASTING OF THE REFRACTORY METALS MOLYBDENUM, COLUMBIUM, TANTALUM, AND TUNGSTEN, by W. H. Johnson. Rept. on Contract AF 18(600)1375. 18 Dec 60, 33p. 33 refs. DMIC rept. 139.
Order from OTS $1.00 PB 151 098

The technology of melting and casting refractory metals is considered from the standpoint of ingots and shaped castings. The production of ingots is more advanced than is the production of shaped castings. Molybdenum and columbium have been centrifugally cast with some success. Shaped castings of tantalum have been produced experimentally. No satisfactory method for the production of shaped tungsten castings is presently available. There is an indicated need for shaped castings of the refractory metals, and further development work appears to be justified. The cold-crucible induction furnace, presently under development for titanium, might be adapted for the refractory metals. (Author)

Defense Metals Information Center, Battelle Memorial Inst., Columbus, Ohio.
PRELIMINARY DESIGN INFORMATION ON RECRYSTALLIZED Mo-0.5Ti ALLOY FOR AIRCRAFT AND MISSILES, by W. P. Achbach and R. J. Favor. [Rept. on Contract AF 33(616)7747]. 16 Jan 61, 12p. 2 refs. DMIC memo. 79.
Order from OTS $0.50 PB 161 229

Data are available on a number of conditions of Mo-0.5Ti alloy but few data on any one condition. Available information indicates that Mo-0.5Ti shows wide variation in properties, depending upon lot, condition, and strain rate. The properties of Mo-0.5Ti in the recrystallized condition have been examined, since it would be expected that this condition would be indicative of the material condition after exposure to high temperatures in service. Preliminary data have shown that differences in recrystallization temperatures of as little as 100 F may significantly affect strength. The data presented are for material recrystallized at 2450 F Also included are properties of recrystallized Mo-0.5Ti protected from oxidation by the W-2 coating.

General Electric Research Lab., Schenectady, N. Y.
HIGH-PRESSURE RESEARCH IN METALS AND CERAMICS, by R. E. Hoffman, J. B. Hudson and others. Rept. for 1 June 58-31 July 60 on Contract AF 33(616)5951. Sep 60, 77p. 58 refs. ARL Technical rept. 60-321.
Order from OTS $2.00 PB 171 025

The volume self-diffusion in pure lead has been studied at pressures up to 40 kb and at temperatures from the melting point at each pressure to about 150°C below this melting point. The influence of pressure on the melting temperature has been obtained from these experiments. The diffusion experiments followed established radioisotope tracer techniques modified for use at high pressures. Attempts to measure grain boundary self-diffusion by the modified techniques were successful. The magnetizations of iron and nickel at room temperature have been studied at pressures up to 3000 atm and fields up to 10,000 oersteds. These measurements of saturation magnetization as a function of hydrostatic pressure were extended to a series of iron-nickel alloys, and the results were used to interpret the interactions between the atomic moments. From similar measurements on an iron-silicon alloy single crystal, results were obtained for the effect of hydrostatic pressure on the magneto-crystalline anisotropy of this material. A study was made of the effects of hydrostatic pressure on the first-order magnetic transitions in the materials MnAs and $MnAu_2$. (Author)

Michigan U., Ann Arbor.
EFFECT OF STATE OF STRESS ON THE FAILURE OF METALS AT VARIOUS TEMPERATURES, by D. R. Jenkins, H. E. Gascoigne and others. Rept. for June 58-Mar 60 on Solid State Research and Properties of Matter, Contract AF 33(616)6041. July 60, 32p. WADD Technical rept. 60-234; AD-245 245.
Order from OTS $1.00 PB 171 366

The purpose of this research program is to evaluate the influence of state of stress and temperature on the fracture of metals. To implement the research, a series of carefully controlled experiments under combined stress conditions is planned. The work described here is concerned primarily with development of test equipment and the test program. Identification of a failure criterion in terms of stress is the ultimate objective. An examination of the technical literature indicates that the factors involved in purely brittle fracture have been identified. For brittle fracture, plausible deformation mechanisms suggest that the principal normal stress and the ratio of principal normal stress to maximum shearing stress are important. Although some of the features of ductile fracture have been noted, a connection with the state of stress has not been proposed. Consequently, the development of a unified theory may be possible for brittle fracture. A unified theory of ductile fracture may be very complex and in particular may require consideration of more than stress alone to be valid. A testing machine has been completed which will simultaneously apply axial load and torsion, or internal pressure and axial load to a hollow tubular specimen. Of the two specimen materials selected, AISI B1113 steel may not be entirely satisfactory but Zamak 3 zinc alloy has given good results in preliminary tests. It is planned to investigate other low-carbon steels as a replacement for the AISI B1113. (Author)

Syracuse U. Research Inst., N. Y.
THE EFFECT OF SEVERAL GEOMETRICAL VARIABLES ON THE NOTCH TENSILE STRENGTH OF 4340 STEEL SHEET HEAT TREATED TO THREE STRENGTH LEVELS, by Volker Weiss, John Sessler and others. Rept. for May 59-May 60 on Metallic Materials, Contract AF 33(616)6523. Sep 60, 42p. 15 refs. WADD Technical rept. 60-310.
Order from OTS $1.25 PB 171 396

The effects of stress distribution and tensile strength level on notch strength were investigated for 4340 sheet. Limited data were also acquired for a very brittle titanium alloy. The stress concentration factor (K) and relative stress gradient (γ), which characterize the stress pattern at the notch root, were determined analytically from elastic theory. Edge-notched sheet specimens were tested for a range of K and γ values. Test results show that the effect of stress gradient on notch strength is fundamentally identical with that of section width. For a brittle material, the stress gradient is the primary factor that influences notch strength at a given value of stress concentration. (Author)

Ferrous Metals

Defense Metals Information Center, Battelle Memorial Inst., Columbus, Ohio.
TITANIUM-ALLOY FORGINGS, by H. J. Henning and P. D. Frost. Rept. on Contract AF 18(600)1375. 19 Dec 60, 89p. 2 refs. DMIC rept. 141.
Order from OTS $2.25 PB 151 100

Current information on the availability, metallurgical and dimensional quality, and mechanical properties of titanium die forgings is summarized. Detailed data on typical forgings are presented, and some forging techniques are discussed. (Author)

Metals and Ceramics Lab., Wright Air Development Div., Wright-Patterson AFB, Ohio.
MECHANICAL PROPERTIES OF BERYLLIUM, by A. E. Riesen and R. T. Ault. Rept. for Mar 58-Mar 60 on Metallic Materials. Sep 60, 37p. WADD Technical rept. 60-425.
Order from OTS $1.00 PB 171 411

The test procedures and results of a mechanical properties determination program which included tensile, torsion, pin shear, creep rupture, and fatigue data on two lots of beryllium are presented. One lot of material was hot pressed with a BeO content of 1.45%; the other lot was hot pressed-hot extruded and contained 1.55% BeO. Emphasis was placed on the fatigue and creep rupture data. Fatigue tests were conducted at room and elevated temperatures with stress ratios of A= ∞ and 0.67. Both lots of material showed surprising strength under fatigue loading conditions whereas beryllium's inherent brittleness manifested itself under static loading conditions by the brittle fractures. The hot pressed-hot extruded material was uniformly stronger and therefore more desirable for design purposes than the material that was only hot pressed. (Author)

Office of Technical Services, Dept. of Commerce, Washington, D. C.
MAGNESIUM. Nov 60, 23p. 442 refs. OTS Selective Bibliography SB-445.
Order from OTS $0.10 OTS SB-445

A bibliography of reports listed in the two OTS monthly abstract journals: U. S. Government Research Reports and Technical Translations. This bibliography includes reports on magnesium metals, alloys, and compounds added to the OTS collection during the period 1950 to December 1960.

Nonferrous (except light) Metals

Brush Beryllium Co., Cleveland, Ohio.
DEVELOPMENT OF WROUGHT BERYLLIUM ALLOYS OF IMPROVED PROPERTIES, by John G. Klein, Leslie M. Perleman and Wallace W. Beaver. Rept. for 1 July 58-30 June 59 on Metallic Materials, Delivery Order 33(616)57-19 and Contract AT(30-1)541. Sep 60, 126p. WADC Technical rept. 58-478, Part II.
Order from OTS $2.75 PB 171 389

Mechanical and physical properties are reported for extruded and/or rolled products fabricated from beryllium-rich alloys of silver, tin, cadmium, zinc, nickel, and copper, as well as beryllium fabricated from subsieve-size powder and powder of higher than normal beryllium oxide content. (Author) (See also PB 151 711)

Massachusetts Inst. of Tech., Cambridge.
VOID FORMATION AND GRAIN BOUNDARY SLIDING IN ALUMINUM-MAGNESIUM SOLID SOLUTION ALLOYS, by Arthur W. Mullendore and Nicholas J. Grant. Rept. for July 58-Jan 60 on Metallic Materials, Contract AF 33(616)5926. Sep 60, 37p. 16 refs. WADD Technical rept. 60-340.
Order from OTS $1.00 PB 171 399

Void formation and growth during creep were observed in aluminum - 1.92 percent magnesium and aluminum 5.10 percent magnesium as a function of temperature, stress, and time. The origin of voids is related to the development of an irregular (serrated) grain boundary and to grain boundary sliding. Grain boundary sliding is shown to result largely from crystal slip crossing the grain boundary. (Author)

New York U., N. Y.
PARTITIONING AND MICRODISTRIBUTION OF INTERSTITIAL ALLOYING IN TITANIUM, by Irving B. Cadoff and Joseph Winter. Rept. for 1 Mar 58-5 Mar 60 on Metallic Materials, Contract AF 33(616)5506. Sep 60, 42p. 11 refs. WADD Technical rept. 60-443.
Order from OTS $1.25 PB 171 412

The partitioning or segregation of excess interstitial solutes at the grain boundaries in alpha phase and beta phase titanium alloys was investigated. Internal friction spectra of dilute alloys of titanium with oxygen, nitrogen and carbon were obtained. From these spectra the activation energy for grain boundary stress relaxation, the net interaction energy of a solute atom with a grain boundary, and the excess solute concentration were calculated. As in previous investigations of this type the partitioning of excess solute was found to obey a relation of the form $C_s = C_o \exp V_s/kT$. The interaction energies were found to lie in the range 0.15 to 0.40 eV for binary interstitial alloys. Tensile measurements indicated that the increase of excess solute at grain boundaries and dislocations brought about by either increasing the bulk concentration or decreasing the equilibrium annealing temperature resulted in an increase in yield strength. The effect of excess solute on yield stress was found to be parallel to its effect on the internal friction spectra. (Author)

Structural Metallurgy and Corrosion

Armour Research Foundation, Chicago, Ill.
A MECHANISM FOR STRESS-CORROSION EMBRITTLEMENT, by E. G. Coleman, D. Weinstein, and W. Rostoker. Technical rept. on Contract Nonr-2602(00). Feb 60, 20p. 7 refs. Rept. no. ARF 2152-10; AD-234 659.
Order from LC mi$2.40, ph$3.30 PB 153 167

It has been demonstrated that stress-corrosion cracks can be initiated on continuous loading in a suitable medium. Results are shown for stainless steel immersed in boiling $MgCl_2$ solution and for a Mg-6%Al alloy in aqueous NaCl-K_2CrO_4 solution at room temperature. This behavior has been used to analyze the stress-corrosion cracking process in terms of the dislocation theory of brittle fracture. It is proposed that the mechanism of cracking originates from a condition of reduced surface energy brought about by adsorption of some ion species from the surrounding medium. An analysis of the grain size dependence of the fracture initiation stress in the stress-corrosion media leads to estimates of reduced surface energies of the order of 100-200 ergs/cm^2 (Author)

Army Engineer Research and Development Labs., Fort Belvoir, Va.
THE RESPONSE OF MATERIALS TO DYNAMIC LOADS, by Francis B. Paca. Master's thesis. 20 July 60, 84p. 120 refs. Technical rept. 1643-TR; AD-243 547.
Order from LC mi$4.80, ph$13.80 PB 153 077

A review is made of the static and dynamic response of materials to stress. The action of stress and strain waves involved during impact is discussed in terms of wave propagation under various boundary conditions. Cottrell's dislocation theory of delayed yielding is discussed. The test apparatus used in the application of dynamic loads are reviewed, and their characteristics are analyzed. A simplified method is presented for conducting dynamic loading tests on materials of various kinds and on materials having a very high strength. (Author)

Defense Metals Information Center, Battelle Memorial Inst., Columbus, Ohio.
STRESS-CORROSION CRACKING: A NONTECHNICAL INTRODUCTION TO THE PROBLEM, by Warren E. Berry. Rept. on Contract AF 33(616)7747. 6 Jan 61, 30p. 119 refs. DMIC rept. 144.
Order from OTS $0.75 PB 151 103

The problem of stress-corrosion cracking is reviewed from a non-technical viewpoint. The recognition of this form of corrosion cracking is discussed. The environments most likely to cause stress-corrosion cracking are pointed out for each alloy system. The action of material composition, stress, environment, temperature, and time on stress-corrosion cracking is discussed and suggestions are made for controlling these variables. The roles of protective coatings, inhibitors, and cathodic protection in reducing cracking susceptibility also are considered. A bibliography of some of the more recent articles on stress-corrosion cracking is included. (Author)

General Electric Research Lab., Schenectady, N. Y.
EFFECT OF BASIC PHYSICAL PARAMETERS ON ENGINEERING PROPERTIES OF INTERMETALLIC COMPOUNDS, by D. L. Wood and J. H. Westbrook. Rept. for Dec 58-Dec 59 on Ceramic and Cermet Materials Development, Contract AF 33(616)6144. Aug 60, 34p. 10 refs. WADD Technical rept. 60-184; AD-246 540.
Order from OTS $1.00 PB 171 393

A method for producing sound, uniform, and reproducible test specimens has been devised and an investigatio made of the effects of basic physical parameters on the mechanical properties. Tensile test specimens of Bi_2Tl and AgMg, produced directly by extrusion, have provided information applicable to future studies of the properties of NiAl. A pronounced yield point is found in AgMg; high strain rate sensitivity of the yield stress has been observed and the effects of grain size, composition and test temperature have been documented. Specimens will withstand loading only at very slow strain rates; after yielding occurs, however, rapid strain rates may be employed. With total elongations of more than 50 per cent, the material is ductile under previously brittle conditions. (Author)

Metals and Ceramics Lab., Wright Air Development Div., Wright-Patterson AFB, Ohio.
EFFECTIVE STRESS CONCENTRATION FACTORS FOR FLIGHT VEHICLE MATERIALS UNDER VARIOUS CONDITIONS DURING FATIGUE TESTING, by V. F. Lardenoit. Rept. for Dec 58-Dec 59 on Metallic Materials. Oct 60, 161p. 31 refs. WADD Technical rept. 60-419.
Order from OTS $3.00 PB 171 410

This report presents in the form of tables and curves, the effective stress concentration factors, K_f, for a number of aircraft materials subjected to various conditions during fatigue testing. The influence on K_f is shown for such parameters as temperature, stress ratio, specimen size, direction of testing, test frequency, fabrication of notches, heat treatment, grain size, and for titanium and its alloys, interstitial constituents and hydrogen level. Because K_f is sensitive to so many variables, no attempt is made to relate it to any of the above listed parameters. (Author)

Metals and Ceramics Lab., Wright Air Development Div., Wright-Patterson AFB, Ohio.
HYDROGEN EMBRITTLEMENT OF TITANIUM ALLOYS, by A. E. Riesen and D. H. Kah. Rept. for Jan 57-Mar 60 on Metallic Materials. Oct 60, 49p. 3 refs. WADD Technical rept. 60-275.
Order from OTS $1.25 PB 171 394

The effect of various hydrogen interstitial contents between 60 parts per million and 312 ppm on the notch sensitivity and low strain rate embrittlement of four titanium alloys was investigated at room temperature. The materials investigated included three alpha-beta alloys: Ti-6Al-4V, Ti-2Al-6Mo, and Ti-2.5Al-16V; and one all alpha alloy, Ti-5Al-2.5Sn, which were all heat treated per manufacturers recommended schedules. An optimum embrittling effect was encountered between 180 to 220 ppm hydrogen content in the alpha-beta alloys. Over the range of hydrogen content investigated the alpha alloy was not appreciably embrittled. (Author)

Physical Sciences Lab., Ordnance Tank-Automotive Command, Center Line, Mich.
METALLURGICAL APPLICATION OF X-RAY PROJECTION MICRORADIOGRAPHY, by John Vettraino and Fred Seppi. 12 Aug 60, 63p. 14 refs. Rept. no. RR-28; AD-246 799.
Order from OTS $1.75 PB 171 381

Four aspects of X-ray projection microradiography were studied to determine the applicability of this technique for metallurgical investigation of ordnance materials. First, methods of preparing the thin specimens necessary for microradiographic examination were studied. Secondly, the resolution of the X-ray projection microscope was measured by theoretical calculation and by several experimental techniques. Several microradiographs were obtained of ferrous and aluminum alloys so that the usefulness of the X-ray microscope could be compared with the optical metallograph. Finally, conversion of the X-ray microscope to a more useful metallurgical instrument capable of recording diffraction data or performing spectrochemical analyses over microscopic sample areas is considered.

Watervliet Arsenal, N. Y.
PRACTICAL EVALUATION OF THE STANDARD STRESS-STRAIN CURVES AND RELATED PROPERTIES, by R. H. Harrington. July 60, 27p. 2 refs. Technical rept. WVTRR-6010; AD-244 642.
Order from OTS $0.75 PB 161 896

The various properties derived from and associated with the standard stress-strain curve are evaluated and related to the behavior of alloys under stress. Several other properties, directly related to the stress-strain curve, are preferable to the 0.10% or 0.20% offset yield strengths for present applications and future developments. Only major experienced opinion can choose the property to best serve the purpose for this new era. It is the ability of an alloy to deform elastically without measurable plastic deformation that determines its most efficient and safe use in most applications. (Author)

NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

Air Force Cambridge Research Labs., Bedford, Mass.
THE DETECTION OF NUCLEAR EXPLOSIONS BY SEISMIC MEANS, by Norman A. Haskell. Guenter Loeser Memorial Lecture. 1959, 30p. GRD TN-60-632
Order from LC mi$2.70, ph$4.80 PB 153 395

General Electric Research Lab., Schenectady, N. Y.
HIGH-ENERGY NUCLEAR PHYSICS RESEARCH PROGRAM, by W. B. Jones. Final rept. for 1 Dec 46-1 Dec 59 on Contract N7onr-332(01). Jan 60, 9p. 19 refs. Rept. no. 60-GC-7; AD-230 162.
Order from LC mi$1.80, ph$1.80 PB 152 866

A 300-Mev nonferromagnetic synchrotron was developed. A program of research in high-energy physics was carried out utilizing the 300-Mev synchrotron and the 100-Mev betatron. Three large equipments for detecting high-energy particles or radiation were constructed: (1) a 6-in. -diam by 4-in. -deep liquid hydrogen bubble chamber, (2) a 250-Mev total absorption Cerenkov counter, and (3) a 300-Mev magnetic pair spectrometer. In the experimental program, 3 types of interactions between high-energy photons and hydrogen were investigated: (1) large angle elastic scattering of photons by protons, (2) inelastic interactions between photons and protons giving rise to the production of neutral and positive pions, and (3) total absorption of photons in hydrogen to study electromagnetic interactions.

Illinois U., Urbana.
PRELIMINARY PROPOSAL FOR OBTAINING EMULSION IRRADIATIONS TO A 30 BEV INTERNAL PROTON BEAM, by R. D. Hill. Technical rept. no. 12 on Contract Nonr-1834(05). 8 Feb 60, 8p. 5 refs. AD-233 132.
Order from LC mi$1.80, ph$1.80 PB 153 151

Naval Ordnance Test Station, China Lake, Calif.
SELECTED CHARACTERSITICS OF MARITIME NUCLEAR POWER SYSTEMS, by Milton Neufeld. 16 Nov 60, 10p. 7 refs. NOTS TP 2582.
Order from LC mi$1.80, ph$1.80 PB 153 407

This memorandum is concerned with determination of selected economic and physical charactersitics of nuclear power plants that might be used in cargo submarines in the 1970-1980 period. Specifically, characteristics are determined for 10, 25, 50, 85 and 100 thermal megawatt (tmw), maximum output reactors, corresponding to approximately 3,400 to 34,000 normal shaft horsepower (assuming maximum sustained shaft horsepower at 110% normal shaft horsepower and reactor system thermal efficiency of 28.5%). Estimates are provided for original cost, operating and maintenance costs, weights, and shielding requirements. References are provided for operating procedures and power plant volumes. (Author)

Technical Operations, Inc. [Arlington] Mass.
A TRANSPORT CALCULATION OF THE NET CURRENT OF PHOTONS IN AN INFINITE ISOTROPICALLY SCATTERING NON-ABSORBING ATMOSPHERE, by John F. Batter, Jr. Rept. on Contract DA 29-044-XZ-587. Mar 58, 18p. 6 refs. Rept. no. TOI 58-8; AFSWP-1052; AD-158 775.
Order from LC mi$2.40, ph$3.30 PB 154 407

This report released for sale to the public 15 Feb 61.

Results are presented of some approximate calculations to determine the net current of photons impinging on a specimen perpendicular to a radius from the source, in a region close to the source. The accuracy of the method used is dependent only upon the fineness of the integration increment chosen. The general solution of the problem is presented and then specialized for the case of no absorptions. The results are presented graphically as photon current in an isotropically scattering atmosphere divided by photon current in a vacuum versus non-dimensional distance.

Vienna U. (Austria).
ON THE FERMI-YANG THEORY OF THE PION, by W. Thirring, K. Baumann, and P. G. O. Freund. Scientific note no. 4 on Contract AF 61(052)265. 10 June 60, 6p. 6 refs. AFOSR-TN-60-962.
Order from LC mi$1.80, ph$1.80 PB 153 309

It is proposed to reduce the strong interactions to the universal weak interaction by considering them as high energy phenomena of the strongly energy dependent weak interaction. According to Fermi and Yang the pion is assumed to be a nucleon-antinucleon bound state. A method presented in a previous paper is used to solve a Bethe-Salpeter equation. The bound state wave function is normalized, and the pion-nucleon coupling-constant is calculated. The latter turns out to be of the order unity although a weak interaction between the fermions is used. (Author)

Instruments and Installations

Cornell U., Ithaca, N. Y.
THE PERFORMANCE OF A Be-Cu PHOTOMULTIPLIER IN THE 100A-300A REGION, by D. H. Tomboulian. Technical rept. no. 3 on Contract Nonr-401(37). Feb 60, 34p. 18 refs; AD-233 222.
Order from LC mi$3.00, ph$6.30 PB 153 131

The high amplification and the wide frequency response of the electron multiplier have led to its use in the detection of a variety of radiations in spectroscopy and nuclear physics. It is the purpose of this paper to describe the performance and reliability of a particular photon counter whose behavior was found to be quite satisfactory in conjunction with the determination of absorption coefficients in the 100A to 300A spectral range.

Materials Research Lab., Watertown Arsenal, Mass
A STEP SCANNER FOR EXPERIMENTS ASSOCIATED WITH A NUCLEAR REACTOR, by J. J. Antal and T. F. Zagaeski. Feb 60, 26p. 5 refs. MRL rept. no. 71; AD-235 654.
Order from LC mi$2.70, ph$4.80 PB 150 708

The design and operation is described of a unit employing a step motor to advance a small mechanical or electromechanical device in precise increments over a large angular range with automatic programming of this operation with a counting cycle and paper tape read-out of all pertinent information. The circuitry is described in detail to facilitate operation and maintenance of the unit. The unit is useful in facilitating procedures such as single-channel analysis, slit scanning during neutron beam alignment, and angular rotation of a crystal spectrometer. (Author)

Michigan U. Coll. of Engineering, Ann Arbor.
BEVATRON EXPERIENCE WITH A HOMOGENEOUS LUMINESCENT CHAMBER, by L. W. Jones, K. Lai and others. Technical rept. on Contract Nonr-1224(23). Feb 60, 19p. 2 refs. 03106-2-T; AD-233 501.
Order from LC mi$2.40, ph$3.30 PB 153 171

The components and uses of the luminescent chamber, and its performance in the photography of cosmic ray tracks, have been discussed in previous papers. The purpose here is to stress results and observations based on what is believed to be the first experience with a luminescent chamber at a multi-Bev high-energy accelerator.

Physics Lab., Wright Air Development Div., Wright-Patterson AFB, Ohio.
AN INVESTIGATION OF THE RESPONSE OF PHOTOMULTIPLIER TUBES, by Gordon H. Griffith. Rept. for Sep 57-Aug 58 on Nuclear Instrumentation. Aug 60, 18p 18p. 5 refs. WADD Technical rept. 60-364.
Order from OTS $0.50 PB 171 402

The response of a photomultiplier tube is related to its average sensitivity and can be improved by using only the most sensitive part of the photocathode. This report presents a number of graphs to illustrate the response of a photomultiplier tube as a function of the point on the photocathode surface that is illuminated and to indicate the improvement in symmetry of the isosensitivity lines that may be achieved by varying the shield voltage. While the observed sensitivities were due primarily to the geometry of the cathode-dynode configuration, they were also due partially to the non-uniform response of the cathode surface. (Author)

Western Ontario U. (Canada).
THE SPECTROSCOPY OF IONIC COLLISIONS. I. DESIGN AND CONSTRUCTION OF A SIMPLE 100 KV PROTON ACCELERATOR, by E. M. Reeves. Scientific rept. no. 4 on Contract AF 19(604)4560; Scientific rept. no. 1 on Contracts AF 49(638)640 and Nonr-2895(00). 1 June 60, 38p. 3 refs. GRD-TN-60-497; AFOSR-TN-60-484; AD-247 898.
Order from LC mi$3.00, ph$6.30 PB 153 636

In order to study the luminosity arising from collisions between positive ion beams and atomic or molecular gas targets over the energy range from 30 to 100 KV., a proton accelerator has been constructed. The accelerator employs an Oak Ridge type ion source with an electrostatic focussing system and magnetic mass analyser to produce a proton ion beam. This first report deals with the technical details of design, construction, and operation of the accelerator, and also the operating conditions under which preliminary observations on the spectra resulting from the ionic collisions have been carried out. Subsequent reports will deal with the experimental programme carried out on the accelerator. (Author)

Nuclear Reactions

Ecole Normale Supérieure (France).
TECHNICAL REPORT. Rept. for 1 Oct 56-30 Sep 58 on Contract AF 61(514)1060. [1958] 71p. 51 refs. AFOSR-TN-59-224; AD-211 606.
Order from LC mi$4.50, ph$12.30 PB 150 693

Included in the report are:
Nucleon-antinucleon forces in the intermediate coupling theory, pub. in Il Nuovo Cimento 8:92-134, Apr 58
Exact determination of phenomenological separable interaction, pub. in Il Nuovo Cimento 8:699-707, June 58
This report summarizes the accomplishments of the last two years and reviews the present situation of the theory of nucleon and antinucleon forces.

Harvard U., Cambridge, Mass.
A RIGOROUS DERIVATION OF FERMI AGE THEORY, by Martin A. Leibowitz. Rept. on Contract Nonr-1866(34). Apr 60, 131p. 32 refs. AD-237 414.
Order from LC mi$6.90, ph$21.30 PB 147 900

Fermi Age Theory provides a good representation of the neutron moderation process in media containing nuclei of only high atomic weight. The purpose of this thesis is to give a rigorous derivation of this theory.

TRG, Inc., Syosett, N. Y.
THE SPM (STOCHASTIC PROCESS METHOD) EQUATION FOR CALCULATING THE SPATIAL VARIATION OF NEUTRON SPECTRA, by Carl N. Klahr and Julius Zell. Rept. for May 59-May 60 on Materials Analysis and Evaluation Techniques, Contract AF 33(616)5187. Sep 60, 158p. 47 refs. WADD Technical rept. 60-312.
Order from OTS $3.00 PB 171 397

Uppsala U. (Sweden).
ANTIPROTON INTERACTION CROSS SECTIONS, by A. G. Ekspong and B. E. Ronne. Technical rept. for 1 Sep 57-1 Sep 58 on Contract AF 61(052)13, phase A. [1958] 76p. 67 refs. AFOSR-TN-58-1077; AD-207 456.
Order from LC mi$4.50, ph$12.30 PB 150 694

Included in the report are:
Antiprotons in nuclear emulsions, pub. in Il Nuovo Cimento 8:84-91, Apr 58
Interactions in flight of negative heavy mesons, pub. in Arkiv för Fysik, v. 14, no. 18, p. 277-292, Sep 58
Emission of charged Σ^+ II from K^--proton capture in nuclear emulsions, pub. in Arkiv för Fysik, v. 14, no. 20, p. 303-314, Sep 58
Decay modes and lifetime of negative heavy mesons, pub. in Arkiv för Fysik, v. 14, no. 19, p. 293-302, Sep 58
The research has been concentrated on two problems, the properties and behaviour of (1) antiprotons and (2) negative K-mesons. The research tool and detecting device has been nuclear research plates. (Author)

Radioactivity

Defense Atomic Support Agency, Washington, D. C.
HIGH ALTITUDE SAMPLING PROGRAM, by Albert K. Stebbins, III. Progress rept. 1 July 59, 33p. 6 refs. DASA 529; AD-227 709.
Order from OTS $1.00 PB 171 361

The high altitude sampling program was initiated to determine the spread of weapon produced fission products through the stratosphere. U-2 aircraft was used to sample stratospheric air at various altitudes along North-South paths from 66° N to 57° S at 70°W. Over 1500 samples were analyzed. Meteorological correlation was used to evolve a model of the stratosphere which accounts for the non-uniform deposition of fission products. The total stratospheric inventory of Sr^{90} as of the fall of 1958 was 1 megacurie. The half-residence time of polar and equatorial injections into the stratosphere was 6 and 12 mo, respectively. The major portion of the stratospheric debris moved into the troposphere through the mid-latitude tropopause break. Predictions of Sr^{90} levels to be found in equilibrium bone were made through 1972. (Author)

Isotopes, Inc., Westwood, N. J.
HASP. ANNUAL BRIEFING NO. 3, ed. by Albert K. Stebbins, III. Technical analysis rept. 15 Dec 59, 112p. DASA 531; AD-240 694.
Order from OTS $2.50 PB 171 362

U-2 aircraft, operated by the Strategic Air Command, have been sampling stratospheric air at various altitudes along North-South paths in the Western Hemisphere from 70° South to 70° North since 1957. Meteorological correlation has evolved a model of the stratosphere which accounts for the non-uniform deposition of fission products. The conclusion is reached that equatorial injections in the 1 to 5 megaton range have a stratospheric half-residence time of around 10 months, while injections in the polar and temperate regions have a stratospheric half-residence time of around 5 months. Larger yield tropical injections probably have residence times on the order of several years. A definite seasonal effect upon the rate of departure of debris from the stratosphere is shown. The major portion of the stratospheric debris moves into the troposphere through the mid-latitude tropopause break. By 1 January 1960, 87% of all material injected into the stratosphere will be on the ground. Predictions of radiation dose from existing nuclear debris of biological significance are made. (Author)

PERSONNEL SUPPLIES AND PERSONAL EQUIPMENT

Arctic Aeromedical Lab., Ladd AFB, Alaska.
ARCTIC FIELD EVALUATION OF GLOBAL GOGGLES, by Robert W. Elsner. [1956] 3p. Technical note AAL-TN-56-3.
Order from LC mi$1.80, ph$1.80 PB 153 509

Testing has been carried out with particular regard to features of goggle use peculiar to the Arctic. These features include function in extreme cold, protection from snow glare, and protection from wind and blowing snow.

Arctic Aeromedical Lab., Ladd AFB, Alaska.
CLEANING AND STERILIZATION OF BUNNY BOOTS, by Lester E. Baribo. [1956] 11p. Technical note AAL-TN-56-10.
Order from LC mi$2.40, ph$3.30 PB 153 516

Bunny boots can be disinfected by several means to provide protection of personnel from contaminating infectious fungi. Formaldehyde gas, dry cleaning, and washing with bleaching compound and strong laundry soap at temperatures of 140-160° F. are adequate. Laundering is the recommended method for cleaning. However, only bunny boots in top condition and slightly soiled will be satisfactory for re-use. (Author)

Arctic Aeromedical Lab., Ladd AFB, Alaska.
DRY COLD EVALUATION OF THE MD-1 ANTI-EXPOSURE SUIT ASSEMBLY, by Robert W. Elsner. [1956] 11p. 1 ref. Technical note AAL-TN-56-2.
Order from LC mi$2.40, ph$3.30 PB 153 508

The MD-1 anti-exposure suit assembly has been field tested for an evaluation of its potential as an arctic survival garment in dry cold conditions. The assembly has been found unsuitable for prolonged wear under these conditions because of inadequate insulation and undesirable moisture accumulation within the outer impermeable garment. (Author)

Arctic Aeromedical Lab., Ladd AFB, Alaska.
RESULTS OF COLD WEATHER TEST ON THE EVACUATION BAG, by Thomas R. A. Davis and Franklin T. Elkins. [1956] 12p. 6 refs. Technical note AAL-TN-56-4.
Order from LC mi$2.40, ph$3.30 PB 153 510

Tests using methods for determining thermal balance were carried out on the currently used evacuation bag. The results show that, without further protection, this piece of equipment, used in the manner described, is unsuitable for transporting casualties on the H13 helicopter in the arctic and subarctic cold. Further tests and modifications are planned for the future. (Author)

Quartermaster Research and Engineering Center, Natick, Mass.
THE PSYCHOACOUSTIC AND COMFORT PROPERTIES OF HELMET COMMUNICATIONS GEAR, by Alexander Cohen. Jan 60, 26p. 17 refs. Technical rept. EP-123; AD-245 090.
Order from LC mi$2.70, ph$4.80 PB 152 688

Sound suppression, speech intelligibility, and comfort properties of the standard communications system used in the Helmet, Combat Vehicle Crewman's, T-56-6, were compared with those of an experimental system (RCA "Quiet Ear" kit). Threshold-shift procedures showed that helmets fitted with the RCA gear gave an average of 11 db more suppression for frequencies 1000 to 8000 cps than those fitted with the standard system. This difference however, was reduced to 5 db in the critical low-frequency range of 250 to 500 cps, while both helmet assemblies provided negligible suppression at 400 cps. The RCA system, despite its increased attenuation, was not believed capable of reducing the intense low-frequency components of vehicle noise to safe levels. Moreover, both systems under test greatly reduced the middle- and high-frequency sounds which are less intense in vehicle noise but are more critical to the perception of speech sounds in the ambient environment. Speech intelligibility with the RCA kit was greater than with the standard item, as determined in a field test using M-48 tanks. Subjective appraisals of comfort, however, showed no preference for either system. The helmet shell showed the greatest limitations in wearability and compatibility with operational tasks. (Author)

PHYSICS

Bureau of Naval Weapons, Washington, D. C.
PRESSURE MEASUREMENTS 0 TO 31.5 IN. Hg. BuWeps-BuShips Calibration Program. 21 June 60, 21p. Secondary Standards Lab. Measurement System Operation Procedure NP-02.
Order from OTS $0.75 PB 171 237

This procedure describes the operation of a secondary standards laboratory calibration system which is used to calibrate absolute pressure instruments and mercurial barometers in the range of 0 to 31.5 in. Hg. This procedure normally applies to the calibration of Test Instruments with accuracies between 0.010 in. Hg and 0.050 in. Hg.

Brown U. Div. of Applied Mathematics, Providence, R. I.
AN INTRODUCTION TO THE MATHEMATICAL THEORY OF PERFECTLY PLASTIC SOLIDS, by P. G. Hodge, Jr. Rept. on Contract N7onr-358(01). Feb 50, 401p. 168 refs. A11-S2/396; ATI-148 927.
Order from LC mi$11.10, ph$62.10 PB 154 291

This report released for sale to the public 10 Feb 61.

Contents:
Basic concepts
Struts and beams
Torsion
Plane strain and plane stress with axial symmetry
Plane strain — general theory
Problems in plane strain
Discontinuous solutions in plane strain
Plane stress. Arbitrary yield conditions
Elastic-plastic problems
Approximate solutions
Extremum principles

Laboratory for Insulation Research, Mass. Inst. of Tech., Cambridge.
PROGRESS REPORT NO. 23. Rept. on Contracts Nonr-1841(10), AF 30(635)2872, and AT(30-1)1937. June 58, 61p. 8 refs.
Order from LC mi$3.90, ph$10.80 PB 150 922

Contents:
Dielectric spectroscopy
  Electrical range
  Optical range
  Electrical and optical investigation of charge-carrier trapping in rutile single crystals
Magnetic resonance
High-field-strength research
Ferroelectrics and ferromagnetics
Semiconductors
Single crystals
Ceramics
(See also PB 145 849)

National Bureau of Standards, Washington, D. C.
MEASUREMENTS AND STANDARDS IN PLASMA-PHYSICS AND ASTROPHYSICS AT THE NATIONAL BUREAU OF STANDARDS, ed. by Lewis N. Branscomb. July 60, 33p. 141 refs. Technical note 59.
Order from OTS $1.00 PB 161 560

Naval Research Lab., Washington, D. C.
A TABLE OF THREE INTEGRALS RELATED TO THE PLANCK FUNCTION, by A. D. Anderson, M. P. Shuler, and R. R. Best. Final rept. 6 Oct 60, 19p. 1 ref. NRL rept. 5532; DASA-1190; AD-245 572.
Order from LC mi$2.40, ph$3.30 PB 149 296

A table of three integrals related to the Planck radiation function has been prepared using the Narec. These integrals give (1) the absorption rate, (2) energy flux, and (3) number of photons absorbed in a volume element at a given distance from a point source. The assumption is made that the predominant emission is x radiation and that the K edge of the absorbing medium is sufficiently less than the peak of the Planck

function to neglect absorption discontinuities. The tabular values are given for the following ranges and intervals of the argument: 0. 001(0. 0001)0. 0099; 0.01(0.001)0.099; 0. 1(0.01)0.99; 1.0(0.1)9.9; 10(1)99; 100(10)990. The table entries are given to four significant figures. Asymptotic formulas are given which are useful for calculating the values of integrals (for energy flux) and (for number of absorbed photons) when the argument is greater than 10. (Author)

Speech Research Lab., U. of Michigan, Ann Arbor.
STUDIES ON IMPULSED RESONATORS. PART I. RECURRENTLY IMPULSED RESONATORS IN SPEECH AND PSYCHOPHYSICAL STUDIES. PART II. DETECTION OF COMPLEX SIGNALS AS A FUNCTION OF SIGNAL BANDWIDTH AND DURATION, by Om P. Gandhi, C. Douglas Creelman and others. Rept. no. 6 on Contract Nonr-1224(22). Feb 60, 42p. 14 refs. 03113-6-P; AD-235 774.
Order from LC mi$3. 30, ph$7. 80 PB 153 170

The need for data on the perception of sounds produced by the excitation of resonance systems is discussed in relation to speech and psychoacoustics. The voltage response of a series of N decoupled low-pass resonator sections to the sudden application of various types of input pulse trains is reviewed. The output of such a series of resonators to a recurrent impulse which is suddenly applied contains a dc term, a series of transient terms at the uncoupled resonator frequencies, and a steady-state term involving the harmonics of the input pulse train. A circuit for psychophysical tests is described which provides a number of discrete positions of resonator frequency and damping. Sound spectrographic analyses demonstrating the transient and steady-state terms for a single resonator are presented. An experimental examination of the efficiency of human observers in detecting a stimulus waveform which consists of a train of damped sinusoids is reported. The signal duration and degree of damping (or spectral bandwidth) were varied, with the energy of the signal held constant. Bandwidth is shown to affect human detection more at long than at short durations. (Author)

Electricity and Magnetism

Ecole Nationale Superieure de Chimie de Strasbourg (France).
CHEMICAL REACTIVITY NEAR CURIE POINTS, by H. Forestier. Final status rept. for Oct 59-30 Sep 60 on Contract DA 91-591-EUC-1296, Continuation of Contract DA 91-508-EUC-395. [1960] 15p. 3 refs.
Order from LC mi$2. 40, ph$3. 30 PB 153 281

The chemical reactivity as a function of temperature is discontinuous, not only near the Curie point of an alloy, but also near the Curie point of the pure ferromagnetic component. Chlorination was allowed to compare the importance of the anomaly of reactivity of several Ni-Cu alloys near the Curie point of Ni. The intensity of the anomalies decreases linearly while the percentage of non magnetic metal increases. Chlorination and sulfidization were allowed to compare the importance of the anomaly in reactivity of several Ni-Cu alloys near the Curie point of the alloy. The order of magnitude of the anomaly seems to be kept up, independently of the copper content. Corrosion of Ni-Cu alloys grows near the Curie point. Importance of this increase of corrosion varies from 0 to 50 % with the reagents used. Besides studying the oxidation of the α phase of Fe-V alloys, it is proved that a transformation takes place near 660°C. Experiments for studying the reactivity of a Palladium rich Co-Pd alloy near the Curie point of cobalt, and the electrochemical behaviour of a nickel electrode near the Curie point of nickel, have not given good results. (Author) (See also PB 143 451)

Instituto Elettrotecnico Nazionale "Galileo Ferraris" (Italy).
MAGNETIC VISCOSITY DUE TO INTERSTITIAL ATOMS ANCHORED IN DISLOCATIONS. MAGNETIC VISCOSITY DUE TO MOTION OF DISLOCATIONS, by Giuseppe Biorci, Andrea Ferro, and Giorgio Montalenti. Technical note no. 2a on Contract AF 61(514)1331. Oct 58, 62p. 37 refs. AFOSR-TN-59-85; AD-210 145.
Order from LC mi$3. 90, ph$10. 80 PB 150 695

Diffusion constants from magnetic measurements agree with those obtained from internal friction: $Q = 32.000$ cal/gr. at., $\tau_0 = 10^{-13}$ sec. in iron sheets loaded with carbon, cold rolled of 7% and aged at room temperature. Above 320°C well annealed Armco specimens show a viscosity field of about 0,5 A/m. The correspondence with mechanical relaxation and the shape of the curve of the magnetic relaxation vs. field strength seem to prove that the observed magnetic viscosity is due to motion of dislocations.

Electronics

Ballistic Research Labs., Aberdeen Proving Ground, Md.
A STUDY OF THE SHOCK WAVE GROWTH FROM A WEAK ELECTRICAL DISCHARGE, by Ona R. Lyman. Aug 60, 29p. 7 refs. Memo. rept. no. 1300; AD-246 716.
Order from LC mi$2. 70, ph$4. 80 PB 153 073

The growth of the shock wave around an electrical spark is studied in an attempt to examine the energy partition in the spark gap. Several treatments of shock phenomena are discussed. It is shown that the treatment of A. Sakurai best describes the shock wave associated with the low energy discharges discussed. (Author)

California U., Los Angeles.
EXTENSIONS IN THE SYNTHESIS OF TIME OPTIMAL OR "BANG-BANG" NONLINEAR CONTROL SYSTEMS. PART III. SYNTHESIS AND ANALYTIC STUDIES OF OPTIMUM TYPE II NONLINEAR CONTROL SYSTEMS WITH COMPLEX ROOTS, by P. Chandaket and C. T. Leondes. Rept. on Contract AF 49(638)438. June 60, 63p. 44 refs. Dept. of Engineering rept. no. 60-47; AFOSR TN-60-960; AD-246 353.
Order from LC mi$3. 90, ph$10. 80 PB 153 099

It is the purpose of this investigation to present the required phase space solution for the optimum nonlinear controller for second-order systems, and thus, to fill an important gap in the literature in the control systems field. The derivation of the required optimum nonlinear controller is a fairly involved process as this report demonstrates. The resultant controller is a fairly complicated device and it presents some practical problems in its mechanization; as a result some compromise optimum nonlinear controllers are presented. The report concludes with studies of the dynamic response capabilities of these systems. A variety of input forcing functions are applied to systems with optimum and compromised optimum nonlinear controllers, and their excellent response capabilities observed. (Author)

Electronics Research Lab., U. of California, Berkeley.
TRANSIENT BEHAVIOR OF AN ELECTRON STREAM AT AND BEYOND LIMITING CURRENT, by W. B. Bridges and C. K. Birdsall. Interim rept. on Contract AF 49(638)102. 2 Aug 60, 29p. 9 refs. IER series no. 60, issue no. 303; AFOSR TN-60-878; AD-245 968.
Order from LC mi$2.70, ph$4.80 PB 152 931

Contents:
Review of dc theory and solutions, broad stream
Dc experiment, thin stream
Theory and solution for limiting current in thin stream
Estimate of the transient behavior at limiting current
Calculations of trajectories

General Electric Co., Schenectady, N. Y.
INVESTIGATION OF VARIOUS ACTIVATOR-REFRACTORY SUBSTRATE COMBINATIONS, by J. H. Affleck. Scientific rept. no. 10 on Contract AF 19(604)4093. 29 Nov 60, 11p. 3 refs. AFCRL-TN-60-1155.
Order from LC mi$2.40, ph$3.30 PB 153 683

Additional data is reported on the thermionic constants and evaporation rates of refractory substrate-activator combinations. A number of systems exhibit favorable emission characteristics but have evaporation rates that are higher than most conventional emitters. Alterations are being made in the barium dispensing alloy to lower the evaporation rate of barium. (Author) (See also PB 152 610)

Molecular Physics and Spectroscopy

Air Force Cambridge Research Labs., Bedford, Mass.
LINE WIDTHS OF PRESSURE BROADENED SPECTRAL LINES, by C. J. Tsao and C. Curnutte (Ohio State U. Research Foundation). Sep 60, 95p. 19 refs. Geophysical Research Papers no. 69; AFCRL-TR-60-279.
Order from LC mi$5.40, ph$15.30 PB 153 392

This report is mainly of a review and expository nature and has been prepared for the purpose of outlining in considerable detail the method of calculating the widths of pressure-broadened spectral lines by using the impact theory of P. W. Anderson. The general quantum mechanical result is derived, the adiabatic approximations are discussed, Anderson's theory has essentially been repeated with some slight changes, and several cases of molecular interactions are treated. The calculations have been extended to include the effect of the nonresonant terms of the interaction matrix which are neglected in Anderson's work. (Author)

Air Force Cambridge Research Labs., Bedford, Mass.
PHENOMENOLOGICAL CONSIDERATIONS OF THE INTERRUPTION THEORY OF LINE BROADENING, by Robert G. Breene, Jr. Guenter Loeser Memorial Lecture. 1956, 18p. GRD-TN-60-630.
Order from LC mi$2.40, ph$3.30 PB 153 393

British Columbia U. (Canada).
THE DETERMINATION OF IONIZATION AND DISSOCIATION POTENTIALS OF MOLECULES BY RADIATION WITH ELECTRONS, by D. C. Frost and C. A. McDowell. Final rept. for 1 Apr 59-30 Sep 60 on Contract AF 19(604)2275. [1960] 36p. 32 refs. AFCRL-TR-60-423.
Order from LC mi$3.00, ph$6.30 PB 153 397

The ionization and dissociation of molecules by electron impact was studied using the retarding potential difference method (R. P. D.) to obtain monoenergetic electrons. Preliminary studies on the photoionization of simple molecules have also been carried out. The electron impact studies have led to a considerable amount of new information about the ionization potentials of molecules and also the electron impact induced dissociation process. Amongst the molecules studied were O_2, the halogens HF, CS_2, N_2O, COS, CO_2, formaldehyde, acetaldehyde, H_2O, F_2O, and methyl cyanide. The photoionization studies were largely restricted to the NO, and NH_3 molecules. (Author)

Mallinckrodt Chemical Lab., Harvard U., Cambridge, Mass.
STARK EFFECT AND DIPOLE MOMENT OF CH_3CHF_2, by George H. Kwei and Dudley R. Herschbach. Rept. on Contract Nonr-1866(14). [1960] 7p. 5 refs. AD-231 493.
Order from LC mi$1.80, ph$1.80 PB 153 153

Measurements were made of nonquadratic Stark effects for the $M = 1$, $J = 1 \rightarrow 2$, "a-type" transitions, and quadratic shifts which occur for the corresponding $M = 0$ lines of the spectrum of the CH_3CHF_2 molecule. The two types of transitions provided two independent determinations of the dipole moment which agreed within experimental error.

Maryland U., College Park.
ELECTRON SPIN RESONANCE, by Roy S. Anderson. Rept. on Contract AF 19(600)1582. Nov 60, 112p. 119 refs. Dept. of Physics Technical rept. no. 200; AFOSR-TN-60-1373; AD-246 896.
Order from LC mi$6.00, ph$18.30 PB 153 291

The relatively recent research technique of electron spin resonance is reviewed with particular emphasis on experimental details, such as apparatus and interpretation. The theoretical section discusses those aspects of the method required both for the initiation and interpretation of experiments. The experimental section considers those details of importance to the design and operation of the apparatus. The following subjects have been treated: (1) quantum mechanical description, including energy levels, selection rules, effects of crystalline electrostatic fields and nuclear magnetic moments, and spin relaxation; (2) principles of spectrographs; (3) radio frequency and microwave components; (4) amplification and detection; (5) magnetic field; (6) sensitivity; and (7) electron-nuclear double resonance technique. (Author)

Massachusetts Inst. of Tech., Cambridge,
THE AXIAL-FLOW COMPRESSOR IN THE FREE-MOLECULE RANGE, by Charles H. Kruger. Rept. on Contract Nonr-1841 (55). Jan 60, 96p. 22 refs. DSR 7-8120; AD-231 465.
Order from LC mi$5.40, ph$15.30 PB 152 874

The performance in the free-molecule range of an axial-flow compressor with flat-plate blades was analyzed. Theoretical calculations are made for single and multiple blade rows, using the Monte Carlo method. Results indicate that density ratios per blade row are significantly greater in the free-molecule range than at aerodynamic conditions. Density ratio is found to increase with increasing blade speed and decreasing blade angle and to decrease linearly with the upstream volume flow rate. Multiple-blade-row calculations show that single-row results may be directly combined with reasonable accuracy. Experimentally, density measurements across a single rotating blade row give density ratios as high as 16:1 and show a good agreement with theoretical results. Density ratio is found to decrease markedly with increasing density level in the transition from the free-molecule range. Suggestions are made regarding the design of a rarefied-gas compressor of this type. A comparison of such a compressor with the commonly employed oil diffusion pumps shows several favorable aspects. The Monte Carlo method is found to be a useful tool for the solution of problems involving the dynamics of rarefied gases. (Author)

Michigan U. Coll. of Engineering, Ann Arbor.
SPIN RESONANCE PROPERTIES OF SAPPHIRES, CERTAIN $A_{II}B_{VI}$ COMPOUNDS, AND CALCITE, by Chihiro Kikuchi. Final rept. on Contract AF 49(638)68. Oct 60, 57p. 67 refs. 2616-17-F; AFOSR-TR-60-131.
Order from LC mi$3.60, ph$9.30 PB 152 836

This report summarizes the electron-spin resonance properties of sapphires with various iron group impurities, of certain $A_{II}B_{VI}$ compounds, and of calcite. A block diagram of a molecular electronic material, such as pink ruby, is given, to indicate possible directions for future investigations. Extensive references are given. (Author)

Ohio State U. Research Foundation, Columbus.
TEMPERATURE EFFECTS ASSOCIATED WITH PRESSURE MODULATED INFRARED SPECTRA, by Richard Ronald Patty (Doctoral thesis) and Dudley Williams. Scientific rept. no. 1 on Contract AF 19(604)6141. Oct 60, 157p. 24 refs. AFCRL-TN-60-815.
Order from LC mi$7.50, ph$24.30 PB 153 657

The work described in this report represents a continuation of the earlier work of James C. Gilfert on pressure modulation of infrared spectra. The construction of a new modulator in which sample volume is known as a function of time has made it possible to obtain a more nearly quantitative interpretation of results obtained in studies of pressure modulated absorption and has permitted the observation of modulated emission spectra of various atmospheric gases. (Author)

Sarah Mellon Scaife Radiation Lab., U. of Pittsburgh, Pa.
A MULTI-MODE CHARGED PARTICLE ANALYZER, by Lorne A. Page. Technical rept. no. 2 on Low Energy Nuclear and Electron Physics, Contract DA 36-034-ORD-2765. [1959] 50p. 11 refs. OOR rept. no. 2211.1-P; AD-233 608.
Order from LC mi$3.30, ph$7.80 PB 150 700

A proposed analyzer for ions or electrons having momentum per unit charge ranging up to one million volts/c is based on cylindrical geometry with a homogeneous magnetic field throughout the apparatus parallel to the axis of symmetry. It is calculated that point to point focus with reasonably good aperture can be had by introduction of a radial electric field over a certain intermediate region, thus having a crossed-field selection operating in the common magentic field. A number of possible modes of operation are discussed, including those applicable to momentum spectrometry, to specific charge sorting, and to recognition of kinematically special knock-on electrons.

Washburn Observatory [Madison, Wis.]
COMPARISON SOURCES FOR LOW-DISPERSION RADIAL-VELOCITY MEASUREMENTS IN THE RED SPECTRAL REGION, by Gerald T. Davidson. Technical rept. on Contract Nonr-2824(00). [1960] 5p. 6 refs AD-232 041.
Order from LC mi$1.80, ph$1.80 PB 153 136

Optics

Bureau of Naval Weapons, Washington, D. C.
INFRARED RADIATION BLACK BODY SOURCES 50°C TO 600°C, 0.0087 TO 0.50 INCH DIAMETER APERTURE. BuWeps-BuShips Calibration Program. 27 Apr 60, 40p. Secondary Standards Lab. Measurement System Operation Procedure NR-01.
Order from OTS $1.00 PB 171 238

This procedure describes the operation of a secondary standard calibration system which is used to calibrate sources of infrared energy by radiometric comparison

against a reference source, the radiation characteristics of which are accurately known. This procedure normally applies to the calibration of Test Instruments with stabilities between 0.02°C and 10°C.

University Coll., Dublin (Eire).
OPTICAL ABSORPTION IN INORGANIC SOLIDS, by W. P. Doyle, G. A. Lonergan, and D. C. Conlon. Annual technical rept. no. 1, 1 Oct 59-30 Sep 60, on Contract DA 91-591-EUC-1283. 20 Oct 60, 10p. 5 refs.
Order from LC mi$1.80, ph$1.80 PB 153 094

The absorption spectra of thin films of germanium monoxide, germanium dioxide, zirconium dioxide, vanadium pentoxide, columbium pentoxide and tantalum pentoxide have been determined from 2000-10,000A. Each material is characterised by strong absorption in the region studied; the threshold photon energies are as follows:- germanium monoxide - 2.7 e.v.; germanium dioxide - 4.3 e.v.; zirconium dioxide - 5.2 e.v.; vanadium pentoxide - 2.4 e.v.; columbium pentoxide - 3.8 e.v.; tantalum pentoxide - 4.4 e.v. The absorption coefficient in the region of high absorption is so large that absorption must be attributed to the bulk lattice and not to impurities. An A.C. method of measuring the spectral distribution of photoconductivity in thin films of solids has been developed. Results are reported for the lead and thallium halides. (Author)

Solid State Physics

Armour Research Foundation, Chicago, Ill.
MECHANISM OF WEAR OF NONMETALLIC MATERIALS, by Edwin J. Latos. Rept. for 1 June 58-31 May 59 on Research on Interface Phenomena, Contract AF 33(616)5962. Oct 59, 19p. 27 refs. WADC Technical rept. 59-316; AD-232 467.
Order from OTS $0.50 PB 171 474

The principal objective of this project is a basic study to evaluate the mechanism of wear of nonmetallic materials at elevated temperatures. Materials selected for this program included single crystals of sapphire and quartz. A friction apparatus was designed for use at high temperatures and has an operating range of 0 to 50 grams load and a speed range of 10^{-3} to 10^{-1} cm/sec. The friction specimens are placed into suitable holders and heated with an induction generator. Initial tests established the reliability of the design of the friction apparatus to operate effectively from room temperature to 1600°F. Design of suitable specimen holders should permit friction studies at temperatures to 4000°F. Sliding of sapphire on sapphire indicated an increase in the coefficient of friction with temperature to approximately 900°F and a decrease with further increases in temperature to 1600°F. The coefficient of friction also increased with load in the temperature region reported. (Author)

Battelle Memorial Inst., Columbus, Ohio.
INDIUM ANTIMONIDE FOR SEMICONDUCTOR-DEVICE FEASIBILITY STUDIES, by F. J. Reid, T. S. Shilliday and others. Rept. on Contract AF 33(616)6450. Apr 60, 67p. 55 refs. WADD Technical rept. 60-387.
Order from OTS $1.75 PB 171 406

The performance of voltage and current regulation using magnetoresistance effects in InSb has been demonstrated analytically for both dynamic and steady-state conditions. Regulation of output voltage to less than 1 per cent of its steady-state value appears practicable. Single crystals of InSb having carrier concentrations in the range 10^{14} to 10^{17} carriers/cm^3 have been characterized by measurements of Hall coefficient, resistivity and electron mobility as functions of temperature, magnetoresistance and Hall effect as functions of magnetic field, and minority-carrier lifetime. Anisotropic distribution of impurities was observed in InSb crystals grown along the [111] axis. This effect can be minimized by pulling crystals on other orientations. Grown p-n junctions of InSb have been prepared, and current-voltage characteristics of diodes from this material have been obtained at 80°K and as a function of temperature. Lifetime values as high as 0.5 microsecond were measured at 80°K. Semiconducting thin films of InSb have been prepared by the flash-evaporation method and were found to be continuous, conducting, and chemically stable. Their composition, thickness, size of crystallites, and electrical properties were determined. (Author)

Diamond Ordnance Fuze Labs., Washington, D. C.
NOTES ON THE RELATIONSHIP OF TEMPERATURE AND RESISTANCE, by Joseph Pearlstein. 1 Dec 60, 9p. 8 refs. Technical rept. TR-888.
Order from OTS $0.50 PB 171 187

This report presents some notes on the relationship of temperature, electrical resistance, and thermal expansion for metals and semiconductors. (Author)

Illinois Inst. of Tech., Chicago.
ELECTRON DENSITY DISTRIBUTIONS IN ZnO CRYSTALS, by Ganesh P. Mohanty and Leonid V. Azaroff. Rept. on Contract AF 49(638)425. 28 Nov 60, 14p. 12 refs. AFOSR-TN-60-1352.
Order from LC mi$2.40, ph$3.30 PB 153 552

Electron density distributions have been determined for two ZnO crystals that had been heated in Zn vapor and for an undoped crystal by very accurate measurements of their x-ray diffraction intensities. An examination of the difference between the electron densities of doped and undoped crystals shows that the doped crystals contain 5-20x10^{19} atoms/cm^3 in the octahedral interstices. The incorporation of this large number of interstitial Zn atoms increases the unit cell volume of the crystal by nearly 0.9%. The density of interstitials is approximately 1000 times greater than that calculated from the elctrical conductivity of these crystals so that it must be concluded that most of the interstitial Zn atoms are electrically neutral. The presence of these interstitials explains why the time required to reach saturation for electrical conductivity is much greater in virgin crystals than in previously doped ones. (Author)

Illinois U., Urbana.
LOW TEMPERATURE PHOTOCONDUCTIVITY OF ADDITIVELY COLORED KCl, by Robert L. Wild, Frederick C. Brown, and N. Inchauspe. Technical note no. 5 on Contract AF 49(638)579. Aug 60, 36p. 29 refs. AFOSR-TN-60-1117; AD-245 540.
Order from LC mi$3.00, ph$6.30 PB 152 604

The main emphasis in this work is on the low temperature yield and transport properties of carriers released by light absorbed in the F. K. and so-called Lüty bands at higher energy.

Institute of Engineering Research, U. of California, Berkeley.
EFFECT OF TEMPERATURE ON THE CREEP OF POLYCRYSTALLINE ALUMINUM BY THE CROSS-SLIP MECHANISM, by N. Jaffe and J. E. Dorn. Rept. for 1 Apr 59-31 Mar 60 on Materials Analysis and Evaluation Techniques, Contract AF 33(616)3860. June 60, 21p. 8 refs. [Series 108, issue 4] WADD Technical rept. 60-53; AD-234 957.
Order from OTS $0.75 PB 171 360

The apparent activation energy for creep of polycrystalline aluminum was determined over the range of 273° to 350°K by the effect of small abrupt changes in temperature on the creep rate. A constant activation energy of 27,400 ± 1000 cal/mole was obtained over strains of 0.003 to 0.23, stresses ranging from 2250 to 6000 p.s.i. and strain rates varying from 0.1145×10^{-5} to 29.5×10^{-5} per minute. Metallographic studies and comparison with theory suggested that creep in this range is controlled by the rate of cross-slip of dislocations. Both X-ray diffraction analyses and room temperature tensile stress-strain data following precreep revealed that the substructure produced in this range by creep under a given stress depended only on the total creep strain being independent of the actual test temperature. As a result it was deduced that the total strain ε during creep under a given stress should be a function of temperature compensated time $\Theta = te^{-\frac{Q}{RT}}$, where t is the duration of the test, Q the apparent activation energy, R the gas constant and T the absolute temperature. A number of creep tests conducted at two different temperatures verified the validity of this conclusion. (Author)

Institute of Tech., U. of Minnesota, Minneapolis.
THE NATURE OF THE NUCLEATION OF PRECIPITATES IN THE SILICON-LITHIUM SYSTEM, by J. W. Ferman and R. A. Swalin. Technical rept. no. 2 on Contract Nonr-710(27). 4 Apr 60, 22p. 13 refs. AD-236 193.
Order from LC mi$2.70, ph$4.80 PB 147 120

The concentration dependence of the kinetics of precipitation of lithium from silicon has been investigated. The precipitation kinetics follow a simple exponential decay process for the last 50% of the precipitation. From this portion of the process, values of τ, the characteristic time, have been calculated and the following relation appears to be valid $\frac{1}{\tau} \sim C_o^{1/3}$ where C_o is the lithium content at the initiation of precipitation. A microscopic technique has been devised to delineate precipitate particles. These appear to have the shape of disks or oblate spheroids and are present to the extent of about $5 \times 10^8/cm^3$. Values of τ calculated from the particle shape and number density are in agreement with the experimentally obtained values. Using the relation $1/\tau \sim C_o^{1/3}$ coupled with Pell's observation that for constant C_o, $1/\tau \sim [O]^{2/3}$, it is deduced that the number density of nuclei are proportional to but not equal to the concentration of dissolved oxygen. Further, the number density of nuclei is independent of C_o, the initial lithium content. The suggestion is made that the nucleation catalyst consists of a complex containing oxygen and some type of lattice defect. (Author)

Laboratory for Insulation Research, Mass. Inst. of Tech., Cambridge.
COLOR CENTERS IN CESIUM HALIDE SINGLE CRYSTALS, by Peter Avakian. Rept. on Contract Nonr-1841(50). Apr 60, 44p. 60 refs. Technical rept. 149.
Order from LC mi$3.30, ph$7.80 PB 147 174

Cesium chloride crystals have been grown from solution with urea activator and from the melt. Cesium bromide and CsI crystals were grown from the melt only. Coloration was produced by 130-kv X rays, 3.0-Mev electrons, and by electrolysis. The absorption of uncolored and colored crystals has been measured from 0.175 to 3.5 μ at 25°, -78°, and -190°C. All three crystals show one strong band in the visible (near infrared for CsI) and several weaker bands at shorter and longer wavelengths, which shift with temperature change.

Laboratory for Insulation Research, Mass. Inst. of Tech., Cambridge.
PRESSURE DEPENDENCE OF THE NÉEL TEMPERATURE IN CoO AND NiO, MEASURED WITH A NEW DILATOMETER, by Theodore P. Janusz. Rept. on Contract Nonr-1841(10). Apr 60, 32p. 19 refs. Technical rept. 150; AD-237 059.
Order from LC mi$3.00, ph$6.30 PB 147 759

A high-pressure dilatometer employing a gaseous pressure medium has been developed to measure, over a range of pressures and temperatures, the change in sample length that occurs in many solid-state phase transformations. The device employs a differential transformer as length detector. The system at present covers a temperature range of -40° to 275°C and a pressure range up to 10,000 atmospheres. With a low-temperature cryostat the temperature range may be extended downward.

Laboratory for Insulation Research, Mass. Inst. of Tech., Cambridge.
A REFINEMENT OF THE DICKITE STRUCTURE AND SOME REMARKS ON POLYMORPHISM IN KAOLIN MINERALS, by Robert E. Newnham (Cavendish Lab., U. of Cambridge). Rept. on Contract Nonr-1841(10). Apr 60, 32p. 23 refs. Technical rept. 148; AD-236 323.
Order from LC mi$3.00, ph$6.30 PB 147 173

The crystal structure of the clay mineral dickite ($Al_2Si_2H_4O_9$) has been refined to a greater accuracy than that reported in an earlier analysis. The refinement was carried out with zero-layer intensity data collected about [100] and [110] using MoKα radiation. Coordinates obtained after ten cycles of (F_O - F_C) difference syntheses gave an R factor of 7.5% for 420 observed reflections. Improved lattice parameters, $a = 5.150 \pm 0.001$, $b = 8.940 \pm 0.001$, $c = 14.424 \pm 0.002$A, $\beta = 96° 44' \pm 1'$, were determined by graphical extrapolation from single-crystal diffraction spectra near $\theta = 90$ degrees. The dickite structure shows several significant distortions from the geometry of the idealized kaolin layer, including deformation and rotation of the silica tetrahedra. The most striking features of the octahedral layer are the extremely short shared edges of 2.37A. A model consistent with the infrared absorption spectra is proposed.

Lincoln Lab., Mass. Inst. of Tech., Lexington.
ANISOTROPY IN PERMALLOY FILMS EVAPORATED AT GRAZING INCIDENCE, by M. S. Cohen. Rept. on Contract AF 19(604)7400. 23 Nov 60, 8p. 2 refs. 53G-0042. AD-246 887
Order from LC mi$1.80, ph$1.80 PB 153 284

The magnetic and optical anisotropies observed in oblique-incidence Permalloy films show anomalous behavior for incidence angles greater than 60° (grazing incidence). In particular the easy axis and the direction of greatest optical absorption are parallel to the vapor beam for incidence angles greater than about 70°, while they are perpendicular to this direction for smaller angles. The anomalies for grazing-incidence films are caused by a shape anisotropy differing from that previously found in lower angle oblique-incidence films. This new shape anisotropy is attributed to the elongation in the beam direction of the particles composing the crystallite chains which are found in all oblique-incidence films; such shape anisotropy has been directly observed by electron microscopy. (Author)

Materials Research Lab., U. of California, Berkeley.
INVESTIGATION OF FACTORS CONTROLLING PROPERTIES OF PRESSURE-SINTERED ALKALI HALIDES, by P. J. Fetta and E. R. Parker. Technical rept. no. 2 on Ductile Ceramics Research, Contract AF 49(638)601. June 60, 24p. 7 refs. Series no. 150, issue no. 2; ARPA Order no. 24-59, Task 2; AFOSR TN-60-707; AD-243 979.
Order from OTS $0.75 PB 171 371

A method is described for producing fine-grained polycrystalline alkali halides by a vacuum pressure sintering technique. CONCLUSIONS: Transparent disks may be prepared from any of the alkali, silver, or ammonium halides. To accomplish this, sufficient pressure, a sufficiently low vacuum, and fine-grained powder of high purity and a reasonably low moisture content must be used. If powder which has not been freshly prepared is used, surface contamination imparts a yellow coloration to the final disk. As the powder ages, this coloration increases until finally only translucent or opaque disks are obtained. The pressure at which a material becomes transparent is related to its lattice energy. The softest disk is produced not at the lowest pressure for transparency but at a higher pressure. This effect seems to be due to surface contamination. The plates are of almost theoretical density. (Author)

Massachusetts Inst. of Tech., Cambridge.
NEUTRON AND X-RAY DIFFRACTION STUDIES OF SOLIDS, by C. G. Shull. Technical rept. no. 5 on Contract AF 18(603)84. 1 Jan 60, 40p. AFOSR TR-60-111; AD-245 613.
Order from LC mi$3.00, ph$6.30 PB 152 982

A summary of the project activities is given in this final technical report. The design characteristics of the three neutron diffraction spectrometers (single crystal analysis, polycrystalline specimen, and polarized beam units) which have been constructed are discussed. A description is given of the monochromating crystal studies and the intensity and resolution studies on the spectrometers which have been performed. Research studies which have been carried out by project personnel are summarized. (Author)

Materials Research Lab., U. of California, Berkeley.
KINETICS AND MECHANISMS OF SOLID-STATE REACTION BETWEEN BARIUM METATITANATE AND BARIUM CARBONATE TO FORM BARIUM ORTHOTITANATE, by E. R. McCartney, L. K. Templeton, and J. A. Pask. Technical rept. no. 7 on Contracts N70nr-29524 and Nonr-222(68). 1 Apr 60, 36p. 5 refs. IER series no. 18, issue no. 7; AD-236 458.
Order from LC mi$3.00, ph$6.30 PB 146 924

Reactions between mixtures of $BaTiO_3$ and $BaCO_3$ powders of controlled particle size to form Ba_2TiO_4 were followed by the loss of weight due to CO_2 evolution. A unique feature of this heterogeneous reaction is the formation of a "$BaCO_3$-phase" by partial reduction of the $BaCO_3$ which readily flows unto the $BaTiO_3$ and resultant Ba_2TiO_4 surfaces. The overall reaction rate is a function of the successive steps of a chemical reaction mechanism, which is interpreted as a nucleation process, and a diffusional mechanism. The ratio of the total surface to the total volume and the geometry of the relative particle distribution are important factors in the overall kinetics. In the temperature range of 800 to 1050°C, the first order rate law, wherein the surface was expressed in terms of the volume or weight, was followed best by mixtures of fine or precipitated $BaCO_3$ and precipitated $BaTiO_3$. The parabolic rate law was followed most closely for mixtures of coarse $BaCO_3$ and precipitated $BaTiO_3$. Zero order kinetics were obtained for mixtures wherein the $BaTiO_3$ was coarse. The activation energy for the first order process is 56-58 kcal. /mole; for the diffusional process, 28-31. In intermediate type mixtures, both processes of the appropriate activation energies were operative. (Author)

New York U., N. Y.
THE STUDY OF A CLASS OF INTERMETALLIC COMPOUNDS, THE CHALCOPYRITES, by S. Zalar and I. Cadoff. Rept. for Feb 57-Aug 60 on Contract AF 33(616)3959. Oct 60, 63p. 15 refs. ARL Technical rept. 50-316.
Order from LC mi$3.90, ph$10.80 PB 150 323

Three compositions of the class of polyatomic semiconductors of the chalcopyrite structure $A^{I}B^{III}C_2^{VI}$ were investigated by thermal, microscopic, mechanical and electronic methods. Only the first two were found to be intermetallic semiconductors, the composition $AuInTe_2$ showing the metallic character of a two phase alloy, $Au_{.25}In_{.25}Te_{.50}$. Melting points, Vickers hardness, micro and macrostructures of $CuInTe_2$, and $Au_{.25}In_{.25}Te_{.50}$ were determined. At room temperature the electrical resistivity of $CuInTe_2$ was of the order of 1×10^{-2} ohm-cm, that of $AgInTe_2$ of the order of 1-10 ohm-cm and that of $Au_{.25}In_{.25}Te_{.50}$ of the order of 1×10^{-4} ohm-cm. (Author)

North Carolina U., Chapel Hill
ROOM-TEMPERATURE DISLOCATION DECORATION INSIDE LARGE CRYSTALS, by Charles B. Childs (National Aeronautics and Space Administration) and Lawrence Slifkin. Rept. on Contract AF 49(638)865. 7 Nov 60, 5p. 4 refs. AFOSR-TN-60-1371.
Order from LC mi$1.80, ph$1.80 PB 153 564

This note describes a technique which displays with great contrast the distribution of dislocations in the interior of large single crystals of silver chloride. (Author)

Office of Technical Services, Dept. of Commerce, Washington, D. C.
SEMICONDUCTORS (SUPPLEMENT TO CTR-340). Sep 60, 20p. 314 refs. OTS Selective Bibliography 435.
Order from OTS $0.10 OTS SB-435

A bibliography of reports listed in the two OTS monthly abstract journals: U. S. Government Research Reports and Technical Translations. This bibliography covers PB reports, AEC reports, and translations on Semiconductors added to the OTS collection during the period April 1950 to October 1960.

Oregon State Coll., Corvallis.
DECREASE OF F CENTER PHOTOCONDUCTIVITY UPON BLEACHING, by Fred C. Hardtke, Allen B. Scott, and Robert E. Woodley. Technical rept. no. 3 on Magnetic Study of Color Centers in Alkali Halides, Contract Nonr-1286(05). 10 Feb 60, 18p. 10 refs. AD-232 897.
Order from LC mi$2.40, ph$3.30 PB 153 143

A quantitative study of the rapid decrease in photoconductivity accompanying the relatively less rapid bleaching of F centers in additively colored KCl is reported. The experimental observations agree, except during very early stages of bleaching, with an equation for the variation of sensitivity with total light absorbed derived upon the assumption that negative-ion vacancies are created and traps of smaller cross section are filled during bleaching. Except during early stages, where several kinds of traps may be present in low concentration, only one kind of trap other than the negative-ion vacancy need be considered. The effects of added divalent ions, both positive and negative, upon photoconductivity are reported. (Author)

[Pennsylvania State U. Coll. of Mineral Industries, University Park].
INFLUENCE OF ASYMMETRICAL FORCE FIELDS ON SOME OPTICAL, CHEMICAL, MECHANICAL AND ELECTRICAL PROPERTIES, by W. A. Weyl and D. P. Enright. O.N.R. Technical rept. nos. 3-7 on Contract N6onr-269, T.O.8. June 49, 153p. 77 refs. ATI-179 543.
Order from LC mi$7.50, ph$24.30 PB 154 297

This report released for sale to the public 17 Feb 61.

Contents:
Influence of surface ions on the rate of inversion of mercuric iodide, by W. A. Weyl and D. P. Enright (TR-3)
On the surface structure and surface properties of crystals and glasses, by W. A. Weyl (TR-4)
Discussion of flow and rupture of cubic crystals from an atomic point of view, by W. A. Weyl (TR-5)
Decomposition of complex anions in asymmetrical force fields (derivation of a theory of detonators) by W. A. Weyl (TR-6)
Dielectric properties of glass and their structural interpretation, by W. A. Weyl (TR-7)

Polytechnic Inst. of Brooklyn, N. Y.
THE CATALYTIC ACTIVITY OF SODIUM TUNGSTEN BRONZES, by E. M. Loebl and F. T. Jones. Technical rept. no. 1 on Research on Catalytic Properties of Semiconductors, Contract Nonr-839(24). 15 Feb 60, 119p. 56 refs. AD-234 112.
Order from LC mi$6.00, ph$18.30 PB 153 147

The catalysis by sodium tungsten bronzes with the general formula Na_xWO_3, where x varied from 0.30 to 0.98 of the ortho-parahydrogen conversion and the H-deuterium (D) exchange, was investigated from 77° to 470°K at pressures from 10 to 40 mm Hg.

Uppsala U. (Sweden).
THE CRYSTAL STRUCTURE OF $SbCl_5 \cdot PO(CH)_3$, by Carl-Ivar Bränden and Ingvar Lindqvist. Technical note no. 12 on Contract AF 61(052)43. 15 Sep 60, 15p. 20 refs. AFOSR-TN-60-930.
Order from LC mi$2.40, ph$3.30 PB 153 310

The crystal structure of $SbCl_5 \cdot PO(CH_3)_3$ has been determined and refined from three-dimensional X-ray data. The compound is isomorphous with $SbCl_5 \cdot POCl_3$. The Sb - O and P - O bond lengths are 1.99 ± 0.02 Å and 1.61 ± 0.02 Å respectively. The Sb - O - P bond angle is $139.0° \pm 2.4°$. Comparisons are made with the structures of $PO(CH_3)_3$ and $SbCl_5 \cdot POCl_3$. The predictions of the bond length variations in these compounds based on the theory for inductive effects on polar bonds has been confirmed. The nature of the P - O bond is briefly discussed. (Author)

Theoretical Physics

Advanced Kinetics, Inc. [Santa Ana, Calif.]
STUDY OF CONDITIONS IN HIGH TEMPERATURE NON-EQUILIBRIUM PLASMA CONFIGURATIONS, by Ralph W. Waniek. Scientific rept. no. 1 (Quarterly) 15 June-15 Sep 60, on Contract AF 19(604)7363. [1960] 8p. AFCRL-TN-60-991.
Order from LC mi$1.80, ph$1.80 PB 153 426

A study was undertaken to calculate the radiative parameters of optically thin, high temperature plasmas. Particular attention is devoted to the Bremsstrahlung radiation obtainable during encounters of the stripped electrons with the ions. The energy radiated at various temperatures and for given particle densities was computed for several wavelengths. A study was conducted on the possibility of measuring the energy of a plasma by stimultaneous determination of the radiant flux at three different wavelengths. The results of these calculations have been used to estimate the signals detectable in a vacuum ultraviolet spectrograph when aimed at a radiating plasma source. Theoretical calculations have been conducted on high-field cusp geometries to be used for plasma containment. (Author)

Brown U. Div. of Applied Mathematics, Providence, R. I.
MAGNETOHYDRODYNAMICS OF CONDUCTING FLUIDS, by G. S. S. Ludford. Scientific rept. no. 2 on Contract AF 19(604)7236. Oct 60, 31p. 38 refs. AFCRL-TN-60-800; AD-246 224.
Order from LC mi$3.00, ph$6.30 PB 153 074

A critical review is presented of magnetohydrodynamic flow of conducting fluids past bodies. Most of the work is of very recent origin and some still awaits publication. The discussion is divided into three parts corresponding to small, large, and general conductivity. (Author)

Forschungsinstitut fllr Physik der Strahlantriebe e. v., Stuttgart (West Germany).
IRREVERSIBLE STOCHASTIC THERMODYNAMICS AND THE TRANSPORT PHENOMENA IN A REACTING PLASMA, by H. J. Kaeppeler and G. Baumann. Final rept. on Contract AF 61(514)939. Nov 56, 97p. 123 refs. AFOSR-TR-57-20; AD-120 462.
Order from LC mi$5.40, ph$15.30 PB 150 688

The investigations presented in this report are a first venture in attempting a theory of transport phenomena in a reacting plasma at elevated and high temperatures As an essential basis for such studies, the equilibrium behavior of a plasma is treated. These equilibrium considerations concern the influence of electrostatic microfields on plasma properties, termination of the electronic partition function, and determination of the plasma composition. Entering into the problem of energy transport, the classical diffusion theory of transport is discussed. Then, an attempt is made at establishing the rudiments of a stochastic description of plasma physics, the thermodynamics of transport phenomena in particular. It is shown that the theory includes the purely statistical methods. For the calculation of internal energy transport, the formal kinetic theory due to Wang-Chang and Uhlenbeck is extended and approximate methods for integration of the collision integrals are derived. Finally the energy transport in the presence of chemical reactions is treated. (Author)

Microwave Lab., Stanford U., Calif.
INVESTIGATION OF MICROWAVE PROPERTIES OF PLASMAS, by M. Chodorow. Scienfific rept. no. 9, 1 May-31 July 60, on Contract AF 19(604)5226. Aug 60, 22p. M. L. rept. no. 747; AFCRL TN-60-998; AD-246 643.
Order from LC mi$2.70, ph$4.80 PB 153 098

Contents:
Plasma research: thermal plasmas; noise in plasmas; harmonic generation in plasmas; cesium plasma tube materials and techniques
Other plasma studies: electron beam interaction with a plasma; plasma parametric amplifier; plasma diagnostic techniques; plasma confinement
(See also PB 150 376)

Parke Mathematical Labs., Inc., Carlisle, Mass
DIFFERENTIAL GEOMETRY AND LAGRANGIAN METHODS IN QUANTUM MECHANICS, by Nathan Grier Parke III. Scientific rept. no. 2 on Contract AF 19(604)7316. Oct 60, 42p. 47 refs. AFCRL-TN-60-1131.
Order from LC mi$3.30, ph$7.80 PB 153 728

Contents:
Geometry and quantum mechanics
Finsler space and classical action
The Lagrangian and spin
Finsler geometry and the calculus of variations
The notion of a tangent space and a metric
The dual tangent space and the Hamiltonian function
The harmonic oscillator as a Finsler space-time manifold.

Physical Research Lab., Space Tech. Labs., Inc., Los Angeles, Calif.
PLASMA OSCILLATIONS, by J. D. Jackson. Rept. on Thermonuclear Propulsion Research, Contract AF 04(647)165. 3 Dec 58, 59p. 15 refs. GM-TR-0165-00535; AD-217 521.
Order from LC mi$3.60, ph$9.30 PB 154 404

This report released for sale to the public 15 Feb 61.

A coherent account is presented of various aspects of plasma oscillations. A discussion is offered of dispersion equations, conditions necessary for the growth or decay of oscillations, the physical mechanism of growing or damping, and the possibility of arbitrary steady state solutions. The mathematical description is in terms of solutions of an initial value problem in small amplitude (linearized) approximations. Some general results are derived for an arbitrary unperturbed velocity distribution of electrons and ions. From these expressions the customary results for a stationary plasma in thermal equilibrium can readily be obtained. For simplicity, one dimensional motion of a simple one component plasma is assumed; collisions between particles and nonlinear effects are not considered. Appropriate generalizations for two component plasmas (electrons and ions), however, are indicated in text. (Author)

Technische Hochschule, Stuttgart (West Germany).
SHOCK WAVES IN PARTLY AND FULLY IONIZED PLASMAS WITH PARTICULAR CONSIDERATION OF THE DETERMINATION OF MEAN EFFECTIVE TEMPERATURES IN PLASMAS USING SHOCK WAVE MEASUREMENTS, by H. J. Kaeppeler, B. Mayser, and K. H. Hocker. Interim rept. (Theoretical part) for 1 Jan-31 Dec 59 on Contract AF 61(052)199. Jan 60, 146p. 94 refs. AD-235 860.
Order from LC mi$7.20, ph$22.80 PB 153 466

Theoretical investigations are presented which constitute a first venture in attempting a general description of shock wave phenomena in plasmas and their applications. Fundamental questions such as a statistical basis for transport equations and conservation laws, limits for description of plasma behavior by macroscopic observables, and the transport equations and conservation laws themselves are discussed. The Rankine-Hugoniot relations for normal shocks in plasmas with external magnetic field in the one-fluid and approximate two-fluid formalism are derived. Shocks in chemically reacting plasmas and in plasmas with radiative emission only are also treated. The application is with respect to plasma shock tubes and the determination of mean effective temperatures in plasmas using shock wave measurements. (Author)

Thermodynamics

Air Force Missile Development Center, Holloman AFB, N. Mex.
THE EFFECT OF VARIOUS CONSTRUCTIONAL ERRORS ON THE EFFICIENCY OF A SOLAR ENERGY COLLECTOR COMPOSED OF SPHERICAL MIRRORS, by Alfred W. Simon (California State Polytechnic Coll.). Nov 60, 14p. AFMDC TN-60-13.
Order from LC mi$2.40, ph$3.30 PB 153 465

It has been proposed that the condenser of a large solar energy collector be constructed of a series of concentric rings of mirrors of approximately square shape and spherical section, arranged on the surface of a geometric paraboloid. In connection with the construction of such a collector, the question arises as to the effect of various constructional errors on the efficiency of light concentration of the mirrors. These errors are those of a misalignment of the mirrors, a misfocusing of the mirrors, and an error in the radius of curvature of the mirrors. The effects of these errors are investigated. It is found that in practice the magnitudes of these errors are such that their effects can be neglected. (Author)

Defense Metals Information Center, Battelle Memorial Inst., Columbus, Ohio.
METHODS OF MEASURING EMITTANCE, by W. D. Wood, H. W. Deem and C. F. Lucks. [Rept. on Contract AF 18(600)1375] 27 Dec 60, 22p. 30 refs. DMIC memo. 78.
Order from OTS $0.50 PB 161 228

The present memorandum covers some of the methods and equipment used in emittance measurements. Since the literature includes many types and variations of measurement methods and equipment, only a general survey of some of the better-known methods is included. References are listed for those who desire more detailed information on specific methods or equipment. (Author) (See also PB 161 222)

[Institute of Engineering Research] U. of California, Berkeley.
THERMAL RADIATION PROJECT, by J. T. Gier. Rept. no. 3 for year ending 1 June 48 on Contract N7[onr] 295(01). 8 June 48, 18p. ATI-210 349.
Order from LC mi$2.40, ph$3.30 PB 154 293

This report released for sale to the public 14 Feb 61.

Completed work is summarized on total normal low temperature emissivities, development of the unidirectional heat flow standard, and the effect of ambient temperature and pressure on thermopile radiometers. In addition, extensive work is summarized on ideal radiators, an optical amplifier, a reflectometer, a total hemispherical radiometer, constants used in radiation work, and a double-barreled radiometer. (See also PB 137 126)

Naval Supersonic Lab., Mass. Inst. of Tech., Cambridge.
THE COMPRESSIBLE TURBULENT BOUNDARY LAYER WITH SURFACE MASS TRANSFER, by F. E. C. Culick. Rept. on Contract AF 49(638)245. Aug 60, 67p. 13 refs. Technical rept. 454; AFOSR-TN-60-1094.
Order from LC mi$3.90, ph$10.80 PB 153 105

An approximate analysis of the compressible turbulent boundary layer on a porous flat plate with distributed surface mass transfer is based on a representation comprising two regions. A large portion of the development is quite general, but only the cases of helium and air injection are computed explicitly. The results are restricted to conditions under which the Prandtl and Schmidt numbers may be regarded as functions of concentration alone. Wall concentration of helium and the reduction in skin friction can be calculated from a modified integral method; heat transfer and recovery temperatures are obtained from the differential energy equation. There seems to be acceptable agreement with measurements, with the exception of optimistic recovery factors and a failure to show observed dependence of skin friction on Mach number. An approximate calculation indicates that if the effects of thermal diffusion are accounted for, the first error may be decreased, with but small change in the calculated heat transfer rate. (Author)

Non-Metallic Materials Lab., Wright Air Development Div., Wright-Patterson AFB, Ohio.
THE EFFECT OF GRAVITY ON FREE CONVECTION HEAT TRANSFER. PART I. THE FEASIBILITY OF USING AN ELECTROMAGNETIC BODY FORCE, by David A. Kirk. Rept. for Apr 59-Jan 60 on Power Transmission Technology. Aug 60, 52p. 29 refs. WADD Technical rept. 60-303, Part I.
Order from OTS $1.50 PB 171 395

Theories concerning the instability and motion of a fluid heated from below predicts the effect of various physical parameters. Experimental investigations have succeeded in widely varying all parameters, except gravity, in order to determine the validity of the theories. In extra-terrestrial heat transfer applications, such as in free convection, boiling, and condensation, the effect of gravity should be verified by experiment. This report considers the feasibility of using an impressed electromagnetic body force acting parallel to the earth's gravitational field. The resultant of this electromagnetic force is said to be an "equivalent gravitational" force acting on the fluid mass. Based on the analysis made, a series of experiments can be performed to ascertain the quantitative contribution of gravity, over the range from -13.6 to 15.6 times ground level gravity, on free convection heat transfer. An apparatus is presently being fabricated to conduct an experiment for the case when heat is applied from below. (Author)

Pennsylvania U., Philadelphia.
DIELECTRIC BREAKDOWN OF LIQUID HELIUM, by C. Blank and M. H. Edwards (Royal Military Coll.). Technical rept. no. 4 on Contract Nonr-551(28). [1960] 16p. 9 refs. AD-232 657.
Order from LC mi$2.40, ph$3.30 PB 153 166

The dielectric strength of liquid He^4 under its saturated vapor pressure has been determined from 1.2 to 4.2°K. With 3/8 inch diameter spherical steel electrodes 0.15 mm apart the average breakdown field, $\bar{E}_b$, is approximately 1 MV/cm, nearly independent of temperature. At spacings of 0.5 and 1 mm, $\bar{E}_b$ is lower, and appears to decrease with decreasing temperature below 2.5°K. The mechanism of breakdown is not clear, but field emission of electrons from the cathode is probably involved, because the average breakdown voltage $\bar{V}_b$, obtained with a point and plane electrode system when the point is negative, is about half that obtained when the point is positive, both above and below the λ-point. Pre-breakdown currents were never detected, and were probably less than 10^{-13} amp, implying an electrical resistivity for liquid helium of 10^{+18} ohm-cm. (Author)

Stanford U., Calif.
CONVECTION HEAT TRANSFER COEFFICIENTS IN DE LAVAL NOZZLES, by R. K. Pefley. Technical rept. no. HS-3 on Contract N6-onr-251, T. O. 6. 1 Oct 51, 50p. 17 refs. ATI-153 158.
Order from LC mi$3.30, ph$7.80 PB 154 294

This report released for sale to the public 10 Feb 61.

The objectives of this program are to determine the local convection heat transfer coefficients in the convergent portion and throat sections of de Laval nozzles; and to determine the effect on the local heat transfer coefficients, particularly at the throat, of varying the contour in the converging section of the nozzle. Three two-dimensional nozzles with pressure gradients and resulting cross-sectional areas have been tested. Heat transfer coefficients have been obtained for both the flat and contoured walls.

Wave Propagation

Army Signal Research and Development Lab., Fort Monmouth, N. J.
MICROWAVE PROPAGATION CHARACTERISTICS IN GERMANIUM, by Harold Jacobs. 10 Nov 59, 21p. 4 refs. USASRDL Technical rept. 2087; AD-233 243.
Order from OTS $0.75 PB 171 377

With the increased interest in the use of semiconductors in microwave devices, the various propagation characteristics of germanium may be of assistance to the design engineer concerned with this area. The microwave propagation constants in germanium have been tabulated and are presented as a function of frequency and conductivity. These calculations are based on classical theory and do not necessarily apply to quantum mechanical effects such as those that occur in cyclotron resonance or in "negative mass" experiments. Data are presented as a summary of properties of microwaves in germanium with resistivities varying between 2 and 10^5 (ohm meters)$^{-1}$. (Author)

Brown U. Div. of Applied Mathematics, Providence, R. I.
A LINE SOURCE ON AN INTERFACE BETWEEN A FLUID AND AN ELASTIC SOLID, by V. M. Papadopoulos. Technical rept. no. 56 on Contracts Nonr-562(10) and 562(24). Apr 60, 39p. 24 refs. C11-56; AD-236 727.
Order from LC mi$3.00, ph$6.30 PB 147 400

The problem of interaction between infinitesimal disturbances propagated in a fluid and in an elastic solid across an infinite plane interface is examined by the method dynamic similarity. The disturbance is the result of the setting up, at time t =o, of an infinite line source of constant strength on the interface; by the word source it is implied that within the fluid a line singularity is associated with a flux which is uniform in all directions and with zero circulation. Seen from the solid the singularity is a line of pressure which is not, however, uniform in all directions. Within the limitations of the theory of propagation of weak shocks the method of dynamic similarity, which is closely related to the conical flow method of Busemann leads to exact formulae for the stress and velocity components everywhere; these results satisfy the correct continuity conditions at the interface. The non-uniform way in which the solution approaches the corresponding elastic half-space solution when the density of the fluid is small relative to that of the solid is described, and the non-uniform way in which the surface wave velocity is affected by the relative density is also discussed. (Author)

General Electric Research Lab. [Schenectady, N. Y.]
TROPOSPHERIC SCATTER PROPAGATION STUDY, by Leonard G. Abraham, Jr. and John A. Bradshaw. Final rept. on Contract AF 19(604)1723. Oct 59, 137p. 50 refs AFCRC TR-59-353; AD-232 924.
Order from LC mi$6.90, ph$21.30 PB 150 718

Contents:
Long-term signal magnitude observations and basic instrumentation
Time lapsed picture and midpoint observation
Correlation of meteorological parameters with hourly median values of the received signal
Fading spectra
The distribution of signal amplitude over short records
Airplane doppler patterns
Effective bandwidth experiments
Minor and incomplete programs
Plans for space diversity experiments
Appendices:
Correlation studies, orthogonality, and numerical results
Derivation of formulae
Statistical nature of tropospheric scattering
Marginal probability distribution for 2 received signal

Institute of Flight Structures, Columbia U., New York.
SURFACE WAVES IN A VISCOELASTIC HALF-SPACE, by Jacob Lubliner. Technical rept. no. 9 on Contract Nonr-266(34) and Technical rept. no. 24 on Contract Nonr-266(08). Apr 60, 26p. 15 refs. CU-1-60-ONR 266(34)CE; CU-1-60-ONR 266(08)CE; AD-238 997.
Order from LC mi$2.70, ph$4.80 PB 148 525

The response of a viscoelastic half-space to a suddenly applied concentrated normal force at its surface is expressed in terms of double complex integrals. The surface-wave response is then reduced to a single integral in the complex frequency plane, and this integral is shown to be approximately expressible in closed form, provided the major contribution comes from a high-frequency region. The limits of the domain (in space-time) in which the high-frequency phase predominates are found by analyzing saddle points of the integrand. (Author)

Institute of Mathematical Sciences, New York U., N. Y.
AN EQUATION FOR THE FIELD AMPLITUDE IN GEOMETRICAL OPTICS, by Irvin Kay. Rept. on Contract AF 19(604)3495. Aug 60, 24p. 4 refs. Research rept. no. EM-161; AFCRL-TN-60-967.
Order from LC mi$2.70, ph$4.80 PB 152 781

The geometrical optics approximation of solutions of the two dimensional wave equation for an isotropic inhomogeneous medium is considered. An ordinary differential equation for a quantity which is inversely proportional to the geometrical optics field intensity (the square of the field amplitude) is derived. This new equation along with the standard ray and phase equations form a system from which a complete wave solution in the optical limit can be calculated numerically, e.g., by means of an analog computer acting as a differential analyzer. The examples of a homogeneous medium and a medium whose index of refraction is a function of one variable are discussed, and the results of the preceding analysis are verified in these two special cases. (Author)

Michigan U. Coll. of Engineering, Ann Arbor.
STUDIES IN RADAR CROSS SECTIONS XLI. PRESSURE PULSE RECEIVED DUE TO AN EXPLOSION IN THE ATMOSPHERE AT AN ARBITRARY ALTITUDE. PART I, by V. H. Weston. Rept. on Contract AF 19(604)5470. Aug 60, 62p. 15 refs. Rept. no. 2886-1-T; AFCRL-TN-60-649.
Order from LC mi$3.90, ph$10.80 PB 152 835

This report is mainly concerned with the gravity wave, produced by explosions not only on the ground, but at various heights in the atmosphere. At present the effect of winds is ignored, but will be considered later. They do have an influence upon the pressure pulse, although the high-frequency acoustical portion is affected the most. It is shown that for certain temperature models of the atmosphere a good approximation can be made to the "gravity" wave mode. This approximation gives good results for Scorer's model of the atmosphere. The pressure pulse for the directly received wave (as contrasted to the antipodal wave) is computed for various ranges, for two models of the atmosphere. In doing so, a simple source model is taken, namely a point source in space with a delta function dependence in time. The intensity of the explosion is given in terms of volume of gas introduced. In the calculation of the pressure pulse at various ranges from the source, emphasis is placed upon the main body of the gravity wave portion. In calculating the head of the pulse a new asymptotic technique is introduced which gives very good results, for intermediate and long ranges.

RESEARCH METHODS, TECHNIQUES AND EQUIPMENT

Electrical Engineering Research Lab., U. of Illinois, Urbana.
REORGANIZATION BY ADAPTIVE AUTOMATION, by Murray Lewis Babcock. Thesis. Technical rept. no. 1 on Contract Nonr-1834(21). 15 Jan 60, 148p. 40 refs. AD-233 187.
Order from LC mi$7.20, ph$22.80 PB 152 876

Using the present limited knowledge of nervous tissue of living organisms as a guide, an attempt is made to construct an adaptive automaton whose internal structure has a similarity to living nervous tissue. Accepting the general contention that living organisms have qualities which show adaptation and self-organization as illustrated by evolution and the individual organism's ability to self-reproduce, the existence of these organisms is taken as a proof that adaptive systems are possible. Thus, the philosophy and operation of a general biological computer is described, the internal components of this computer having functional operation very similar to that of a biological neuron--a basic component in nervous tissue. After describing this general automaton, complete functional specifications of the individual elementary components are ideally established. Using these specifications of so-called artificial neurons, an attempt to reduce the automaton to practice by the use of electronic techniques is made. In this reduction the elementary components are considered as highly versatile information processors, the result being an electronic model of an

information system having some of the structural and functional characteristics of nervous tissue. Several of these electronic elementary components were constructed. Experimental tests on these components essentially corroborate the similarity desired between them and the biological neurons. (Author)

Human Sciences Research, Inc., Arlington, Va.
SYNTHESIS AND COMPARISON OF SYSTEM RESEARCH METHODS: REPORT OF PHASE II, by J. E. McGrath and P. G. Nordlie. Rept. no. 9 on Contract Nonr-2525(00). Feb 60, 147p. 477 refs. HSR-RR-60/1-sm; AD-234 463.
Order from LC mi$7.20, ph$22.80 PB 153 129

Contents:
Key problems of system research methodology
Stages of the system research process
The requirement-setting stage
The design guidance stage
The system development stage
The system evaluation stage
A tactical framework for weapon system studies
An approach to a descriptive theory of combat
The combat fundamentals
Mission
System capabilities
Tactics: application of system capabilities
Methodological functions of a descriptive theory of combat
Methods for systematic projections
Some requirements for a projection methodology
An approach to a method of projection
Translation of requirements into design guides
Theory of allocation of functions to man and machines
Theory of method for system evaluation

Institute for Applied Experimental Psychology, Tufts U., Medford, Mass.
A SURVEY OF OPERATIONS AND SYSTEMS RESEARCH LITERATURE, by Margaret W. Raben. Rept. on Contract Nonr-494(13). 1 Jan 60, 125p. 1,021 refs. AD-233 505.
Order from LC mi$6.30, ph$19.80 PB 152 914

Contents:
Capacities of man and machine: comparison of man and machine; automation
Methods of experimental and engineering psychology: general experimental method; engineering psychology; cybernetics; methods for studying group processes
Operations and systems research methods in general
Communication and information theory: the human link in communications systems
Game or decision theory and linear programming
Computers and simulation
Queueing theory and work measurement techniques
Man as a system component
Groups as system components: groups structure and task; interpersonal factors
Communication problems
Transportation problems: weapon systems - aircraft and missiles; ground transportation systems; ocean transportation systems
Air traffic control
Production, maintenance and supply problems

National Research Labs., Ottawa (Canada).
NON-AERONAUTICAL APPLICATIONS OF LOW-SPEED WIND TUNNEL TECHNIQUES, by P. J. Pocock Sep 60, 131p. 385 refs. Mechanical Engineering rept. MA-243.
Order from LC mi$6.90, ph$21.30 PB 153 633

Low-speed wind tunnel techniques have been used in the study of many non-aeronautical problems. This report describes some of the work that has been done along these lines. Wherever possible, reports of experimental work are cited, and among the 385 references are several describing the wider implications of the various problem areas. (Author)

Office of Ordnance Research, Durham, N. C.
PROCEEDINGS OF THE CONFERENCE [NO. 5] ON THE DESIGN OF EXPERIMENTS IN ARMY RESEARCH DEVELOPMENT AND TESTING, SPONSORED BY THE ARMY MATHEMATICS STEERING COMMITTEE CONDUCTED AT THE U.S. ARMY BIOLOGICAL WARFARE LABORATORIES, FORT DETRICK, FREDERICK, MARYLAND, 4-6 NOVEMBER 1959. Oct 60, 380p. 160 refs. Rept. no. 60-2.
Order from LC mi$11.10, ph$57.60 PB 152 927

Contents: The method of paired comparisons; Measure of competing exponential mortality risks with especial reference to the study of smoking and lung cancer; Army research and development; Prediction of the reliability of complex systems; On the repeated-measurements design in biological experiments; Design of experiments using germfree animals; The development of parameters for determining the resistance of selected missile components to microbiological deterioration; Design of environmental experiments for reliability prediction; Multidimensional staircase designs for reliability studies; A proposed research program for providing a quantitative basis for preventive maintenance policies on ordnance equipment; Statistical analysis of various parameters of burning characteristics of flare systems; A statistical evaluation of the pyrotechnic electrostatis sensitivity tester; Dispersion strengthening analysis of cermets; Experimental determination of "best" component levels in thermal power supplies; Medical health statistics; Sampling in biological populations; The application of fractional factorials in missile test programs; The design and redesign of an experiment; Estimating the parameters of a modified poisson distribution; Detecting and quantifying guess responses in the rating of statements by a method of successive intervals; Design for estimation by covariance techniques; Design of an experiment to evaluate a bio-assay with non-parallel slopes; The ORO aircraft vulnerability experiment; Operational hit probabilities of experimental antitank weapons; Elimination of bias introduced by transformation of variables; Mathematical and statistical principles underlying chemical corps inspection procedures for product verification; Measuring a complex field operation; The conduct of military field research on a shoe-string; Sample order statistics of the circular normal distribution; Determination of systematic errors in tracking radar. (See also PB 143 833)

Ohio State U. Research Foundation, Columbus.
VOWEL DISCRIMINATION AMONG FOREIGN NATIONALS, by Henry M. Moser, Herbert J. Oyer and others. Technical rept. no. 57 on Contract AF 19(604)4575. Sep 60, 26p. 5 refs. [AFCCDD] TN-60-39.
Order from LC mi$2.70, ph$4.80 PB 153 430

This study is concerned with the ability of foreign nationals to discriminate between English vowels. The foreign national must not only learn English sounds which are not in his language, but also to differentiate between those English speech sounds which are similar to sounds in his native language. However, knowledge of the importance of discriminative learning, or the difficulties faced in learning a new language, does not afford specific information about the discrimination ability of foreign nationals when learning English. It was felt that a study of vowel discrimination would reveal information which might facilitate the foreign nationals' comprehension of the English language. (Author)

Syracuse U., N. Y.
A NOTE ON THE ERGODIC THEOREM OF INFORMATION THEORY, by K. L. Chung. Research rept. no. 31 on Contract AF 49(638)265. Oct 60, 5p. 4 refs. AFOSR-TN-60-1245; AD-247 243.
Order from LC mi$1.80, ph$1.80 PB 153 360

The purpose of this note is to extend the result of Breiman to an infinite alphabet, or equivalently, the result of Carleson to convergence with probability one. (Author)

Photographic Equipment

Flight Accessories Lab., Wright Air Development Div., Wright-Patterson AFB, Ohio.
THE CHANGE IN APPARENT IMAGE SIZE CAUSED BY MOTION DURING PHOTOGRAPHIC EXPOSURE, by L. V. Larson. Rept. on Windshield Jet Air Blast Rain Removal. May 60, 18p. 4 refs. WADD Technical note 60-26; AD-246 653.
Order from OTS $0.50 PB 171 385

A photograph of a moving object is always blurred to some extent. If the size of the object is measured from the photograph, this blurring changes the apparent size. The case treated is an object viewed in silhouette. The gradation in light quantity striking the areas partially shaded by the moving edges of the object is derived for flash tube and shutter controlled exposure. With the aid of photographic film characteristics, the resulting image is reconstructed and the apparent change in size determined. Change in size is found to be a function of film contrast and ratio of object movement during exposure to object length in direction of motion. The effects of diffraction and imperfect focus are considered. In the general case an interaction between the various causes of blurring is found. In the more practical case of small errors due to focus and diffraction, and small movement during exposure, the interaction is negligible and the error due to movement is directly proportional to the amount of movement. (Author)

Observatoire de Haute-Paris (France).
THE ELECTRONIC CAMERA, by Andre Lallemand. Nov 60, 21p. 14 refs. ARL Technical rept. 60-324.
Order from LC mi$2.70, ph$4.80 PB 152 588

It is possible to detect as little as one single photoelectron with the improved modern electronic camera which was basically conceived and first demonstrated by Professor A. Lallemand in 1936 and further developed since 1953 by him and his associates at the Laboratoire de Physique Astronomique of the Paris Observatory. This electronic camera is of utmost importance for astronomical work especially for obtaining spectroscopic recordings, because the exposure time necessary for conventional photography may be reduced with this device by a factor of more than 100. With it the spectra of distant nebula have been recorded using an exposure time of two minutes and resulting in a better quality than can be obtained with the conventional methods in 10 hours 37 min of the same object by employing the same telescope. The electronic camera can be used with a grain counting device also for nuclear research work and a gain of 10,000 with respect to conventional photography is possible. (Author)

SOCIAL SCIENCES

Alaska U., College.
PRELIMINARY REPORT ON AIR FORCE - ESKIMO CONTACTS, by W. H. Oswalt. Dec 56, 14p. Technical note AAL-TN-56-14.
Order from LC mi$2.40, ph$3.30 PB 153 520

This report concerns the techniques for establishing successful working relationships between Armed Forces personnel and the Eskimos of isolated villages in western Alaska. The assumption is that the Armed Forces require satisfactory face-to-face relationships with Eskimos, and that the Armed Forces desire to minimize any disorganizing effects that their presence may have in a village.

Alaska U., College.
REPORT ON AIR FORCE - ESKIMO CONTACTS, by James W. VanStone. Dec 56, 30p. Technical note AAL-TN-56-15.
Order from LC mi$2.70, ph$4.80 PB 153 521

The purpose of this report is to discuss some of the problems that may arise when groups of military personnel, or white civilians under contract to the military, take up residence in or near an Eskimo village for varying lengths of time. The suggestions made here will aim toward achieving maximum cooperation between the two groups and a minimum of friction due to misunderstandings on the cultural level. (See also PB 153 520)

Arctic Aeromedical Lab., Ladd AFB, Alaska.
OBSERVATIONS ON THE CONTEMPORARY ESKIMO OF WAINWRIGHT, ALASKA, by Frederick Milan. Jan 58, 80p. 37 refs. Technical rept. 57-14.
Order from LC mi$4.50, ph$12.30 PB 153 367

A group of contemporary Alaskan Eskimos, the uluRunikamiut, living in the arctic coastal village of Wainwright was studied during the summer of 1951. Despite the introduction of a money economy and an annual village income of about $65,000, the cycling season still determine the annual round of exploitative activities and there is a definite preference for native type foods. Cooperative hunting and sharing of the catch continues. The people are bilingual, speaking both iNNupiaq, or Eskimo, and English. The religious beliefs of the uluRunikamiut are based upon somewhat modified Christian teachings of the Presbyterian Church and a residuum of aboriginal practices. (Author)

Harpur Coll., State U. of New York [Endicott, N. Y.]
A COMPARATIVE STUDY OF OFFSHORE CLAIMS IN NORTHWESTERN EUROPE, by Lewis M. Alexander. Final rept. on Contract Nonr-1349(03). Feb 60, 248p. 193 refs.
Order from LC mi$11.10, ph$37.80 PB 153 121

Seven of the nine northwestern European countries considered have territorial belts 3 miles in breadth, while Norway and Iceland claim 4 miles. Three international borders in offshore areas are in dispute: (1) the Dollart-Ems area between the Netherlands and West Germany; (2) the channel of the West Schelt between the Netherlands and Belgium; and (3) the seaward extensions of the border between Ireland and Northern Ireland. The waters of Iceland, northern Norway, and the Faroe Islands are important as fishing areas, and it is here that the problems of local vs. foreign fishermen are particularly acute. There is uncertainty over future attempts at a world conference to achieve a universal breadth for the territorial sea and rules for the delimitation of baselines in the case of island groups and archipelagos. (See also PB 148 580)

Institute for Quantitative Research in Economics and Management, Purdue U., Lafayette, Ind.
THE CAPITAL STRUCTURE OF FIRMS AND THE RISK OF FAILURE, by James P. Quirk. Rept. on Contract Nonr-1100(16). Feb 60, 27p. 4 refs. Institute Paper no. 2; AD-233 687.
Order from LC mi$2.70, ph$4.80 PB 153 148

An investigation is presented of the effects of default risk on the portfolio policies of lenders and the capital structure of firms under conditions of perfect competition and constant returns to scale, interpreted in a stochastic sense. A simplified model of the process by which firms obtain financing is developed, employing the assumptions of the complete information-measurable utility theory. Within the context of this model, propositions are established concerning the impact of default risk on choices by lenders and intrepreneurs. (Author)

Documentation

Institute for Cooperative Research, U. of Pennsylvania, Philadelphia.
INFORMATION RETRIEVAL STUDY, by John O'Connor. Annual summary rept. no. 1, 1 Apr 59-31 Mar 60, on contract Nonr-551(35). 31 Mar 60, 10p.
Order from LC mi$1.80, ph$1.80 PB 153 770

Contents:
The possibilities of document grouping for reducing retrieval storage size and search time
On retrieval in aid of scientific discovery
A note on the possibility of a divided structure file permitting arbitrary substructure searches
Some suggested mechanized indexing investigations which require no machines

National Bureau of Standards, Washington, D. C.
A SURVEY OF COMPUTER PROGRAMS FOR CHEMICAL INFORMATION SEARCHING, by Ethel C. Marden and Herbert R. Koller. Feb 61, 87p. 197 refs. NBS technical note 85.
Order from OTS $2.25 PB 161 586

The authors describe twelve computer systems for searching chemical literature. Preceding discussion of the computer systems, a brief description is given of different chemical notation systems, indexing and abstracting procedures, punched card systems (which were the forerunners of the computer systems), and special purpose literature searching machines. A short discussion of the difficulties (linguistic and other) attendant to literature searching terminates the paper. (Author)

Naval Weapons Lab., Dahlgren, Va.
INFORMATION RETRIEVAL AT THE NAVAL WEAPONS LABORATORY MISSILE SAFETY INFORMATION CENTER, by R. C. Turner, Jr. 27 Oct 60, 56p. 1 ref. NWL rept. 1724; AD-245 809.
Order from LC mi$3.60, ph$9.30 PB 152 978

A very important part of the Missile Safety Information Center at the Naval Weapons Laboratory, Dahlgren, Virginia, is the Information Retrieval Function. The use of this retrieval function permits a rapid and low-cost search of the publications maintained in (or referenced by) the Information Center. The search for discrete information is limited to those characteristics under which each publication has been cataloged. Every attempt has been made to keep the retrieval system comprehensive, flexible and not unwieldy. This report defines the categories of information used in cataloging the publications and discusses the following elements of the Information Retrieval Function: (a) Determining the Search Code, (b) Requesting a Search, (c) Search Results (format). (Author)

Thermophysical Properties Research Center, Purdue U. [Lafayette, Ind.]
ANALYTICAL AND EXPERIMENTAL STUDY OF A METHOD FOR LITERATURE SEARCH IN ABSTRACTING JOURNALS, by A. O. Cezairliyan, P. S. Lykoudis, and Y. S. Touloukian. Dec 60, 79p. 3 refs. TPRC rept. 11.
Order from OTS $2.00 PB 171 478

A new method for literature search using abstracting journals developed by Lykoudis, Liley and Touloukian is extended. The method consists of searching an abstracting journal for a certain period of time and then obtaining new information by going through the bibliography section of the papers located by the direct

search of the abstracting journal. This procedure can be repeated in cycles. According to the model of the new method of literature search, a direct search of Chemical Abstracts is made to locate publications on seven thermophysical properties (thermal conductivity, specific heat, viscosity, diffusion coefficient, emissivity, thermal diffusivity, and Prandtl number) for all matter. This search is done for the period between January 1954 and December 1957. The references cited by each publication thus uncovered are searched to obtain further new information on the above mentioned properties.

MISCELLANEOUS

Naval Research Lab., Washington, D. C.
REPORT OF NRL PROGRESS. Mar 61.
Order from OTS $1.25, $10.00/year PB 171 316

Contents:
Articles:
Penetration of the Ionosphere by Very Low Frequency Radio Signals—Some Preliminary Results of the LOFTI I Experiment, by R. W. Zeek, L. S. Bearce, J. P. Leiphart, and E. Toth
Regulated Charging Current Supply for Van de Graaf Accelerators, by J. W. Butler
X-Ray Mass Absorption Coefficients for Mo, Nb, Zr, and Ti, by W. R. Sweeney, R. T. Seal, and L. S. Birks
Scientific program:
Atmosphere and Astrophysics: Surface characteristics of the moon as indicated by the March 1960 eclipse and other observations
Chemistry: Interpretation of some measurements of hydrogen over-potential on palladium. Influence of temperature on the viscosity and drainage rates of mechanically produced fire-fighting foams
Mechanics: Fracture stress of high-strengths specimen sheet steels (X-200, M-255, and 300-M) subjected to various environments
Metallurgy and Ceramics: Corrosion of iron alloy (25%Cr-3%Al) by a melt containing oxides of vanadium and sodium. High-temperature oxidation of iron-nickel binary alloys in water vapor. Effects of sintering time and temperature on the oxide bond strength of metal (nickel) couples. Relation of total neutron dosage and irradiation temperature to neutron-induced changes in various pressure-vessel steels. Effects of alloying elements on niobium-zinc protective coatings for niobium. Oxidation of niobium-titanium alloys. Kinetics of the formation of niobium-zinc compounds on niobium in zinc vapor
Nuclear and Atomic Physics: Electrically exploded wires: progress report on experiments and theory
Radio: Adaptation of shore radio towers as broadband communication antennas. Laboratory studies of the polar absorption mechanism. Digital computer programmed for mutually interference-free communication channel selection. Use of atmospheric absorption loss curves for calculating radar range. Proposed mechanism for electrical breakdown in high vacuum electron tubes. Project Trade Winds IV. Enhanced reliability of Lyman-α humidiometer used in radio-meteorological investigations. Atmospheric refraction of radio frequency electromagnetic waves. Solid-state inductance circuits. Parasitic antenna arrays approaching the gain of a parabolic reflector
Solid State Physics: Cavity ionization chamber for determining exposure dose rates and calibrating kilocurie gamma ray sources (Co^{60})
Sound: Capacitor types suitable for use under high hydrostatic pressure

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Reports may be purchased in accordance with instructions on the inside front cover of the U. S. GOVERNMENT RESEARCH REPORTS. As PB numbers are not indicated, order by series and number. These reports may also be consulted at any AEC Depository Library. A list of these libraries may be obtained from the U. S. Department of Commerce, Office of Technical Services, Washington 25, D. C.

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General, Miscellaneous, and Progress Reports

Aircraft nuclear propulsion project quarterly progress report for period ending June 10, 1951. Oak Ridge National Laboratory, Oak Ridge, Tenn. Sep 51. Decl. with deletions November 16, 1959, Contract W-7405-eng-26. 181p. Order from LC. Mi $8.70, ph $30.30. ANP-65(Del.)

Chemical technology division. Chemical development section B monthly progress report for October, 1959, by R. E. Blanco. Oak Ridge National Laboratory, Oak Ridge, Tenn. Jan 60. 47p. Order from LC. Mi $3.30, ph $7.80. CF-59-12-20

Unclassified research and development programs executed for the division of reactor development and the division of research for April 1960, by L. H. McEwen. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. May 60. Contract AT(45-1)-1350. 60p. Order from LC. Mi $3.60, ph $9.30. HW-65078

The sodium graphite reactor: tomorrow's power plant, by R. J. Beeley and others. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Apr 60. Contract AT-11-1-GEN-8. 39p. Order from LC. Mi $3.00, ph $6.30. NAA-SR-Memo-5114

Summary technical report for the period October 1, 1955, to December 31, 1955. Volume II, by J.W. Simmons. National Lead Company of Ohio, Cincinnati, Ohio. Jan 56. Decl. April 28, 1960. Contract AT(30-1)-1156. 96p. Order from LC. Mi $5.40, ph $15.30. NLCO-601

Applications of ultrasonic energy. Progress report no. 17 covering period from August 1, 1959 to September 30, 1959. Aeroprojects, Inc., West Chester, Pa. Oct 59. Contract AT(30-1)-1836. 39p. Order from LC. Mi $3.00, ph $6.30. NYO-2571

Applications of ultrasonic energy. Task no. 1: Chemical processing. Task no. 2: Metal and ceramic powder processing. Progress report no. 18 covering period from October 1, 1959 to November 30, 1959. Aeroprojects, Inc., West Chester, Pa. Dec 59. Contract AT(30-1)-1836. 38p. Order from LC. Mi $3.00, ph $6.30. NYO-2572

Aircraft nuclear propulsion project quarterly progress report for period ending September 10, 1952, by W.B. Cottrell. Oak Ridge National Laboratory, Oak Ridge, Tenn. Nov 19, 1955. Decl. with deletions November 16, 1959. Contract W-7405-eng-26. 146p. Order from LC. Mi $7.20, ph $22.80. ORNL-1375 (Del.)

Electronuclear research division semiannual progress report for period ending March 20, 1954, by E. T. Howard. Oak Ridge National Laboratory, Oak Ridge, Tenn. May 54. Decl. May 3, 1960. Contract W-7405-eng-26. 26p. Order from LC. Mi $2.70, ph $4.80. ORNL-1670

Sandia Corporation papers on reliability and related topics, by L. W. Newhouse. Sandia Corporation, Albuquerque, N. Mex. June 59. 17p. Order from OTS. 75 cents. SCR-99A

Semiannual progress report for the period ending December 31, 1959. University of California, School of Medicine, Los Angeles, Calif. 1959. Contract AT-04-1-GEN-12. 107p. Order from LC. Mi $5.70, ph $16.80. UCLA-457

Nonmilitary uses of nuclear explosions, by H. Brown. University of California. Lawrence Radiation Laboratory, Livermore, Calif. Jan 60. Contract W-7405-eng-48. 22p. Order from LC. Mi $2.70, ph $4.80. UCRL-5832

Densities and velocities measured on specimens from instrument and shot holes, by R. S. Guido and S. E. Warner. University of California. Lawrence Radiation Laboratory, Livermore, Calif. May 60. Contract W-7405-eng-48. 17p. Order from LC. Mi $2.40, ph $3.30. UCRL-5990

Some potential uses of nuclear explosives in the conservation and development of water resources. University of California. Lawrence Radiation Laboratory, Livermore, Calif. May 60. Contract W-7405-eng-48. 26p. Order from LC. Mi $2.70, ph $4.80. UCRL-6008

Plowshare program; peaceful uses for nuclear explosives, by D. B. Lombard. University of California. Lawrence Radiation Laboratory, Livermore, Calif. July 60. Contract W-7405-eng-48. 19p. Order from LC. Mi $2.40, ph $3.30. UCRL-6081

Biology and Medicine

Semiannual report to the Atomic Energy Commission by L. O. Jacobson and M. Doyle. Argonne Cancer Research Hospital, Chicago, Ill. Sep 60. Contract AT(11-1)-69. 113p. Order from OTS. $2.50. ACRH-14

Protein structure and function. Report of symposium held June 6 - 8, 1960, by D. E. Koshland, Jr. and others. Brookhaven National Laboratory, Biology Department, Upton, N. Y. 1960. 266p. Order from OTS. $2.50. BNL-608 (C-30)

Effect of radiation on the uptake of S^{35} -labeled sulfonamide. Final report, by F. E. Ray. University of Florida, Cancer Research Laboratory, Gainesville, Fla. May 60. Contract AT (40-1)-2097. 9p. Order from LC. Mi $1.80, ph $1.80. ORO-258

The effects of ionizing radiations on the developing animal with special reference to the nervous system. Progress report and application of renewal of Atomic Energy Commission Contract AT(30-1)-1454, by S. P. Hicks. New England Deaconess Hospital and Harvard University, Medical School, Boston, Mass. June 60. 68p. Order from LC. Mi $3.60, ph $9.30. TID-6159

Effect of ionizing radiation on the viability and antigenicity of patho-gens of domesticated animals. Final report for May 1, 1957- April 30, 1960, by Iowa State University of Science and Technology, and Iowa State University of Science and Technology, Institute for Atomic Research, Ames, Iowa. 1960. Contract AT(11-1)-59. 26p. Order from LC. Mi $2.70, ph $4.80. TID-6217

Factors influencing the metabolism of copper and iron. Period covered: July 1, 1959 to June 30, 1960, by Johns Hopkins University, Baltimore, Md. July 60. Contract AT(30-1)-1816. 12p. Order from LC. Mi $2.40, ph $3.30. TID-6221

Quantitative population genetics of mice under irradiation. Progress report for July 1, 1959 to June 30, 1960, by E. L. Green. Roscoe B. Jackson Memorial Laboratory, Bar Harbor, Maine. July 60. Contract AT(30-1)-1979. 10p. Order from LC. Mi $2.40, ph $3.30. TID-6278

Radioactive zinc-65 in marine organiams in Fishers Island Sound and its estuaries. Progress report and renewal proposal, by D. M. Skausen. University of Connecticut, Storrs, Conn. [1960]. Contract AT(30-1)-2487. 5p. Order from LC. Mi $1.80, ph $1.80. TID-6307

Achlohydria in Hiroshima. Relation to age, radiation and ABO blood groups, by J. L. Knittle. Atomic Bomb Casualty Commission, Hiroshima, Japan. [1959]. 17p. Order from LC. Mi $3.00, ph $6.30. TID-6328

Urinalysis for curium by electrodeposition, by I. Dupzyk and M. W. Biggs. University of California, Lawrence Radiation Laboratory, Livermore, Calif. Dec 60. Contract W-7405-eng-48. 18p. Order from OTS. 50 cents. UCRL-6168

Genetic effects of chronic X-irradiation exposure in mice, by D. R. Charles and others. The University of Rochester, Atomic Energy Project, Rochester, N. Y. Nov 60. Contract AT(40-1)-2136. 354p. Order from OTS. $4.50. UR-565

Chemical Separations Processes for Plutonium and Uranium

Chemical engineering division summary report for January, February, and March 1957. Argonne National Laboratory, Argonne, Ill. 1957. Decl. March 21, 1960. Contract W-31-109-eng-38. 132p. Order from LC. Mi $6.90, ph $21.30. ANL-5730

Solvent extraction studies: pulse generators. Quarterly report for May 10, 1951 to August 10, 1951, by A. C. Jealous. Oak Ridge National Laboratory, Oak Ridge, Tenn. Aug 51. Decl. March 23, 1960. Contract W-7405-eng-26. 13p. Order from LC. Mi $2.40, ph $3.30. CF-51-8-162

Recent developments in feed preparation and solvent extraction, by F. E. Blanco and J. C. Bresee. Oak Ridge National Laboratory, Oak Ridge, Tenn. May 59. 67p. Order from LC. Mi $3.90, ph $10.80. CF-58-11-91 (Rev.)

Hot cell demonstration of the fused salt volatility process, by C. I. Cathers and others. Oak Ridge National Laboratory, Oak Ridge, Tenn. June 60. 21p. Order from LC. Mi $2.70, ph $4.80. CF-60-3-11

Anion exhange separation of trivalent actinides and lanthanides, by M. H. Lloyd and R. E. Leuze. Oak Ridge National Laboratory, Oak Ridge, Tenn. June 60. Contract W-7405-eng-26. 12p. Order from LC. Mi $1.80, ph $1.80. CF-60-3-23

Reaction of uranyl nitrate hexahydrate with sulfur, by R. S. Ondrejcin. E. I. du Pont de Nemours & Company, Savannah River Laboratory, Aiken, S. C. July 60. Contract AT(07-2)-1. 8p. Order from OTS. 50 cents. DP-497

Reprocessing of power reactor fuels. Eleventh quarterly progress report for April 1, 1960 to July 1, 1960, by L. H. Meyer and others. E. I. du Pont de Nemours & Company, Savannah River Laboratory, Aiken, S. C. Aug 60. Contract AT(07-2)-1. 17p. Order from OTS. 50 cents. DP-519

Decomposition of the tributyl phosphate-nitrate complexes, by G. S. Nichols. E. I. du Pont de Nemours & Company, Savannah Rieer Laboratory, Aiken, S. C. Nov 60. Contract AT(07-2)-1. 23p. Order from OTS. 50 cents. DP-526

Reprocessing of power reactor fuels. Twelfth quarterly progress report for July 1, 1960 to October 1, 1960, by E. S. Occhipinti and others. E. I. du Pont de Nemours & Company, Savannah River Laboratory, Aiken, S. C. Jan 61. Contract AT (07-2)-1. 8p. Order from OTS. 50 cents. DP-546

The hydrolysis products of tributyl phosphate and their effect on the tributyl phosphate process for uranium recovery, by R. M. Wagner. Hanford Works, Richland, Wash. Apr 51. Decl. April 21, 1960. Contract W-31-109-Eng-52. 39p. Order from LC. Mi $3.00, ph $6.30. HW-19959

Liquid-liquid dispersions and the significance of the disengaging test, by L. L. Burger and others. Hanford Works, Richland, Wash. July 52. Decl. March 28, 1960. Contract W-31-109-Eng-52. 12p. Order from LC. Mi $2.40, ph $3.30. HW-24989

Semiworks studies for the reduction of corrosion-product impurities in UR-plant UO_3, by L. C. Amos and others. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. July 53, Decl. May 4, 1960. 10p. Order from LC. Mi $1.80, ph $1.80. HW-28492

PUREX—a Hanford separation plant, by W. J. Mundt. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Apr 55. Decl. May 12, 1960. 5p. Order from LC. Mi $1.80, ph $1.80. HW-36427

Nuclear safety consideration for continuous ion exchange column design, by N. Ketzlach. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Mar 56. Decl. April April 27, 1960. Contract W-31-109-Eng-52. 4p. Order from LC. Mi $1.80, ph $1.80. HW-41838

Confinement and collection of UO_2 fines from a shearing operation, by G. Rey. Hanford Atomic Products Operation, Richland, Wash. Oct 60. Contract AT(45-1)-1350. 21p. Order from OTS. 50 cents. HW-63854

The pilot plant operation of a vertical tube, recirculating dissolver for the dissolution of uranium dioxide in nitric acid, by P. W. Smith. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. May 60. Contract AT(45-1)-1350. 10p. Order from LC. Mi $1.80, ph $1.80. HW-64416

Technology of non-production reactor fuels reprocessing budget activity 2790 quarterly report, by V. R. Cooper. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. May 60. 18p. Order from LC. Mi $2.40, ph $3.30. HW-65267

The sulfex process terminal development report, by F. D. Fisher. Hanford Atomic Products Operation, Richland, Wash. Aug 60. Contract AT (45-1)-1350. 26p. Order from OTS. 75 cents. HW-66439

Modifications for the STR fuel recovery process, by O. W. Parrett. Phillips Petroleum Company, Atomic Energy Division, Idaho Falls, Idaho. Dec 60. Contract AT(10-1)-205. 52p. Order from OTS. $1.00. IDO-14522

Equilibrium data for PUREX systems, by J. W. Codding and others. Knolls Atomic Power Laboratory, Schenectady, N. Y. Nov 51. Decl. February 4, 1960. Contract W-31-109-Eng-52. 31p. Order from LC. Mi $3.00, ph $6.30. KAPL-602

Idaho chemical processing plant project completion, by D. R. Rogers and B. B. Schroeder. Phillips Petroleum Company, Atomic Energy Division, Idaho Falls, Idaho. Dec 55. 158p. Order from LC. Mi $7.80, ph $25.80. M-6862

Determination of plutonium and uranium in scrup dissolver solutions, by R. W. Foster and J. H. Cooper. Oak Ridge Natinnal Laboratory, Oak Ridge, Tenn. July 55. Decl. June 10, 1960. Contract W-7405-eng-26. 28p. Order from LC. Mi $2.70, ph $4.80. ORNL-1854

Preparation of americium dioxide by thermal decomposition of americium oxalate in air, by R. D. Baybarz. Oak Ridge National Laboratory, Oak Ridge, Tenn. [nd]. Contract W-7405-eng-26. 8p. Order from OTS. 50 cents. ORNL-3003

Power reactor fuel processing pilot plant Brookhaven fuel program, by W. T. McDuffee. Oak Ridge National Laboratory, Oak Ridge, Tenn. [nd]. Contract W-7405-eng-26. 64p. Order from OTS. $1.50. ORNL-3013

Electron accelerators requiring high peak power pulse modulators, by V. L. Smith. University of California, Lawrence Radiation Laboratory, Livermore, Calif. June 60. Contract W-7405-eng-48. 4p. Order from LC. Mi $1.80, ph $1.80. UCRL-6019-T

Chemistry

Physical properties of the halogen fluorides and their solutions, by M. T. Rogers. Michigan State University, East Lansing, Mich. [1959?] 5p. Order from LC. Mi $1.80, ph $1.80. AECU-4720

Design and mass transfer study for new multistage fluidization reactor, by K. D. Williamson, Jr. Argonne National Laboratory, Argonne, Ill. Dec 60. Contract W-31-109-eng-38. 155p. Order from OTS. $2.75. ANL-6267

Analysis of UN solutions for NA, by V. J. Reilly. Oak Ridge National Laboratory, Oak Ridge, Tenn. Sep 52. Decl. with deletions December 1, 1959. 3p. Order from LC. Mi $1.80, ph $1.80. CF-52-9-170(Del.)

The reaction of zirconium with uranium dioxide, by M. T. Robinson. Oak Ridge National Laboratory, Oak Ridge, Tenn. June 57. Decl. April 20, 1960. 12p. Order from LC. Mi $2.40, ph $3.30. CF-57-6-42

Chemical technology division, chemical development section C monthly progress report for November 1959, by K. B. Brown and others. Oak Ridge National Laboratory, Oak Ridge, Tenn. Jan 60. Contract W-7405-eng-26. 52p. Order from LC. Mi $3.60, ph $9.30. CF-59-11-132

Nitric acid species in Tri-n-butyl phosphate solutions by W. E. Shuler. E. I. du Pont de Nemours & Company, Savannah River Laboratory, Aiken, S. C. Sep 60. Contract AT(07-2)-1. 29p. Order from OTS. 75 cents. DP-513

Thermodynamic and transport properties of gaseous carbon dioxide, by L. H. Chen. General Dynamics Corporation, Electric Boat Division, San Diego, Calif. Aug 59. Contract AT(04-3)-187. 157p. Order from OTS. $2.75. GA-1038

The colorimetric determination of chromium in uranium compounds, by O. A. Vita and L. R. Mullins, Jr.. Goodyear Atomic Corporation, Portsmouth, Ohio. Dec 60. Contract AT(33-2)-1. 11p. Order from OTS. 50 cents. GAT-T-843

Liquid scintillation spectrometry for the analysis of Zr^{95}—Nb^{95} mixtures and coincidence standarization of these isotopes, by J. D. Ludwick. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Aug 59. Contract AT (45-1)-1350. 17p. Order from LC. Mi $2.40, ph $3.30. HW-61728

The transfer of uranyl nitrate across the water-tributyl phosphate interface, by L. L. Burger. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Nov 59. Contract AT(45-1)-1350. 49p. Order from LC. Mi $3.30, ph $7.80. HW-62087

The preparation of plutonium powder by a hydriding process--initial studies, by G. L. Stiffler and M. H. Curtis. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Mar 60. Contract AT(45-1)-1350. 17p. Order from LC. Mi $2.40, ph $3.30. HW-64289

Ion exchange separation and coulometric titration of plutonium in irradiated fuel element solutions, by J. W. Handshuh. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. June 60. Contract AT(45-1)-1350. 21p. Order from OTS. 50 cents. HW-66441

Hydrolysis of water-saturated chlorofluorocarbons in the presence of metals and the associated corrosion, by A. V. Faloon and R. L. Farrar, Jr. Union Carbide Nuclear Company, Division of Union Carbide Corporation, Oak Ridge Gaseous

Diffusion Plant, Oak Ridge, Tenn. Feb 61. Contract W-7405-eng-26. 20p. Order from OTS. 50 cents. K-1461

Thermodynamic properties of refractory bordies. Part I. Evaporation behavior and vapor pressure of zirconium diboride. Part II. Phase studies in the tantalum--boron system between Ta and TaB, by J. M. Leitmaker. Los Alamos Scientific Laboratory, Los Alamos, N. Mex. Jan 60. Contract W-7405-eng-36. 266p. Order from LC. Mi $11.10, ph $41.40. LA-2402

Reduction of uranium trioxide to uranium dioxide with hydrogen-reaction rates at various temperatures, by C. W. Kuhlman, Jr. Mallinckrodt Chemical Works, St. Louis, Mo. Oct 48. Decl. November 23, 1959. 6p. Order from LC. Mi $1.80, ph $1.80. MCW-142

Report of pilot plant work on UF_4 production by means of stirred fluidization, by E. K. Teter. Mallinckrodt Chemical Works, St. Louis, Mo. Nov 49. Decl. January 28, 1960. 6p. Order from LC. Mi $1.80, ph $1.80. MCW-238

The vaporization behavior and thermodynamic stability of zirconium carbide at high temperature, by B. D. Pollock. Atomics International. A Division of North American Aviation, Inc., Canoga Park, Calif. Jan 61. Contract AT(11-1)-GEN-8. 19p. Order from OTS. 50 cents. NAA-SR-5439

The radiochemistry of zirconium and hafnium, by E. P. Steinberg. Argonne National Laboratory, Lemont, Ill. Jan 60. 52p. Order from OTS. 50 cents. NAS-NS-3011

The radiochemistry of beryllium, by A. W. Fairhall. Department of Chemistry, University of Washington, Seattle, Wash. May 60. 58p. Order from OTS. 75 cents. NAS-NS-3013

Semi-annual progress report for the period January 1960 through June 1960, by C. J. Rodden. New Brunswick Laboratory, New Brunswick, N. J. Jan 61. 67p. Order from OTS. $1.75. NBL-165

A process for the recovery of uranium and scandium from uranium refinery raffinates, by G. P. Lang and others. Mallinckrodt Chemical Works, St. Louis, Mo. May 54. Decl. March 15, 1960. Contract W-14-109-eng-8. 45p. Order from LC. Mi $3.30, ph $7.80. NYO-1365

Current practices of reporting spectrochemical results of uranium samples, by H. R. Mullin. New Brunswick Laboratory, AEC, New Brunswick, N. J. Feb 54. Decl. March 7, 1960. 105p. Order from LC. Mi $5.70, ph $16.80. NYO-2046

Quarterly summary report for the period January 1, 1960 to March 31, 1960. Radiation Applications Inc., New York, N. Y. 1960. Contract AT(30-1)-2318. 3p. Order from LC. Mi $1.80, ph $1.80. NYO-2525

A report on the "metal E" enriched uranium program, by W. A. Oppold. Mallinckrodt Chemical Works, St. Louis, Mo. Oct 51. Decl. March 15, 1960. 21p. Order from LC. Mi $3.30, ph $7.80. NYO-5249

Molecular association in alkali halide vapors. Thesis, by S. Datz. Oak Ridge National Laboratory, Oak Ridge, Tenn. May 60. Contract W-7405-eng-26. 77p. Order from LC. Mi $4.50, ph $12.30. ORNL-2933

Adsorption of xenon and argon on graphite, by M. C. Oak Ridge National Laboratory, Oak Ridge, Tenn. [nd]. Contract W-7405-eng-26. 21p. Order from OTS. 75 cents. ORNL-2955

Coulometric determination of uranium in power-reactor-fuel-dissolver solutions, by B. B. Hobbs. Oak Ridge National Laboratory, Oak Ridge, Tenn. [nd]. Contract W-7405-eng-26. 16p. Order from OTS. 50 cents. ORNL-2987

An investigation of the spectrographic analysis of high purity rare earth oxides. Thesis, by Y. G. Ishida. University of Kentucky, Lexington, Ky. 1959. Contract AT(40-1)-2124. 79p. Order from LC. Mi $3.90, ph $10.80. ORO-279

Theory of α-decay, by H. J. Mang. University of California, Lawrence Radiation Laboratory, Berkeley, Calif. Oct 59. Contract W-7405-eng-48. 73p. Order from LC. Mi $4.50, ph $12.30. UCRL-8931

Oxidation potential of the Ce(III) - Ce(IV) couple as a function of temperature in perchloric acid solutions--thermodynamic properties, by H. L. Conley. University of California, Lawrence Radiation Laboratory, Berkeley, Calif. Aug 60. Contract W-7405-eng-48. 46p. Order from OTS. $1.00. UCRL-9332

Separation of uranium from urine by a tri-n-octylphosphine oxide column and an automation of the procedure, by W. C. Deitrich and others.

Union Carbide Nuclear Company, Division of Union Carbide Corporation, Oak Ridge, Tenn. Sep 60. Contract W-7405-eng-26. 37p. Order from OTS. $1.00. Y-1322

Controlled Thermonuclear Processes

Quarterly status report of the LASL controlled thermonuclear research program for period ending November 20, 1960, University of California, Los Alamos Scientific Laboratory, Los Alamos, N. Mex. Dec 60. Contract W-7405-ENG-36. 42p. Order from OTS. $1.00. LAMS-2488

Discharge clean up in the etude stellarator, by M. S. Jones, Jr. and L. G. Smith. Princeton University, Project Matterhorn, Princeton, N. J. Mar 60. 55p. Order from OTS. $1.50. MATT-29

Stability of non-linear traveling waves in a cold plasma, by E. A. Jackson. Princeton University, Project Matterhorn, Princeton, N. J. Oct 60. Contract AT(30-1)-1238. 8p. Order from OTS. 50 cents. MATT-53

A liquid-helium-cooled trap for pumping gas by adsorption, by G. Gibson and others. University of California, Lawrence Radiation Laboratory, Livermore, Calif. Oct 60. Contract W-7405-eng-48. 22p. Order from OTS. 50 cents. UCRL-6113

Some calculations on the triax pinch device, by S. Fisher. University of California, Lawrence Radiation Laboratory, Berkeley, Calif. Aug 60. Contract W-7405-eng-48. 35p. Order from OTS. 75 cents. UCRL-9344

Controlled thermonuclear research quarterly report for June, July, August 1960, by R. F. Post. University of California, Lawrence Radiation Laboratory, Berkeley and Livermore, Calif. Sep 60. Contract W-7405-eng-48. 107p. Order from OTS. $2.25. UCRL-9393

Experiments on Alfvén-wave propagation, by J. M. Wilcox and others. University of California, Lawrence Radiation Laboratory, Berkeley, Calif. Nov 60. Contract W-7405-eng-48. 31p. Order from OTS. 75 cents. UCRL-9482

Criticality Studies

Thorium uranium physics experiments (TUPE). Monthly report for October 1959, by R. C. Anderson and others. Babcock and Wilcox Company, Atomic Energy Division, Lynchburg, Va. 1959. Contract AT(11-1)-766. 27p. Order from LC. Mi $2.70, ph $4.80. BAW-1179

Critical experiments for reactor physics studies, by R. Gwin and D. W. Magnuson. Oak Ridge National Laboratory, Oak Ridge, Tenn. Sep 60. 64p. Order from LC. Mi $3.90, ph $10.80. CF-60-4-12

Design criteria for PRP--critical facility. Project CAH-842, by G. L. O'Neill and H. K. Nelson. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Dec 59. 93p. Order from LC. Mi $6.00, ph $18.30. HW-62117

Criticality calculations with regard to the dissolution of 2% enriched slugs, by J. W. Webster. Phillips Petroleum Company, Atomic Energy Division, Idaho Falls, Idaho. June 55. Decl. April 28, 1960. Contract AT(10-1)-205. 10p. Order from LC. Mi $1.80, ph $1.80. IDO-16280

Bare critical assemblies of oralloy at intermediate concentrations of U-235, by H. C. Paxton and others. Los Alamos Scientific Laboratory, Los Alamos, N. Mex. May 54. Decl. January 4, 1960. Contract W-7405-eng-36. 46p. Order from LC. Mi $3.30, ph $7.80. LA-1671

In situ neutron multiplication measurements on a calcining furnace, by M. G. Arthur and others. Dow Chemical Company, Rocky Flats Plant, Denver, N. J. Dec 57. Decl. June 10, 1960. Contract AT(29-1)-1106. 8p. Order from LC. Mi $1.80, ph $1.80. RFP-91

Plexiglas reflected assemblies of plutonium, by C. L. Schuske and others. The Dow Chemical Company, Rocky Flats Plant, Denver, Colo. Jan 61. Contract AT(29-1)-1106. 7p. Order from OTS. 50 cents. RFP-213

Angular distribution of neutrons from a graphite surface, by A. C. Jones, Jr. University of California, Lawrence Radiation Laboratory, Livermore, Calif. Nov 60. Contract W-7405-eng-48. 49p. Order from OTS. $1.25. UCRL-6223

Engineering and Equipment

Heat transfer to a mist flow, by J. D. Parker and R. J. Grosh. Argonne National Laboratory, Argonne, Ill. Jan 61. Contract W-31-109-eng-38. 234p. Order from OTS. $3.00.
ANL-6291

Development testing and performance evaluation of liquid metal and molten salt heat exchangers, by R. E. MacPherson and M. M. Yarosh. Oak Ridge National Laboratory, Oak Ridge, Tenn. Mar 60. 43p. Order from LC. Mi $3.90, ph $10.80. CF-60-3-164

Temperature distribution in a hollow fuel pellet and in the surrounding metal wall, by D. R. Carver. Oak Ridge National Laboratory, Oak Ridge, Tenn. Aug 60. 14p. Order from LC. Mi $2.40, ph $3.30. CF-60-8-51

Stresses produced in remote studs by impact and slowly applied tightening torque, by K. L. Pell and N. H. Shoup. Hanford Atomic Products Operation, Richland, Wash. Apr 58. Contract AT(45-1)-1350. 56p. Order from OTS. $1.25.
HW-67257

Dynamic analysis of the superheater, by J. W. Crowe. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. June 59. 14p. Order from LC. Mi $2.40, ph $3.30. NAA-SR-Memo-3974

General heat transfer mechanisms suitable for use in OMR fuel elements. A literature survey and evaluation study, by J. D. Wilde. Atomics International. Division of North American Aviation, tion, Inc., Canoga Park, Calif. [195?]. 64p. Order from LC. Mi $3.90, ph $10.80.
NAA-SR-Memo-4020

Heat transfer and thermodynamic properties of mercury, by P. D. Cohn. Atomics International Division of North American Aviation, Inc., Canoga Park, Calif. Nov 59. 29p. Order from LC. Mi $3.00, ph $6.30.
NAA-SR-Memo-4666

Effect of fins and heater wires on heat transfer properties in capsule design, by R. O. Pearson. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Dec 59. 10p. Order from LC. Mi $2.40, ph $3.30.
NAA-SR-Memo-4743

Centrifugal pump characteristics in the near-boiling range, by S. Sudar and A. Gallegos. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Jan 60. 18p. Order from LC. Mi $2.40, ph $3.30.
NAA-SR-Memo-4906

Design of two electromagnetic pumps for NaK, by R. S. Baker and W. J. Fraser. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Mar 60. 11p. Order from LC. Mi $2.40, ph $3.30.
NAA-SR-Memo-5106

In-pile corrosion test loops for aqueous homogeneous reactor solutions, by H. C. Savage and others. Oak Ridge National Laboratory, Oak Ridge, Tenn. [nd.]. Contract W-7405-eng-26. 66p. Order from OTS. $2.00. ORNL-2977

Design criteria for printed circuit boards, by E. L. Chavez and others. Sandia Corporation, Albuquerque, N. Mex. Nov 60. 63p. Order from OTS. $1.75. SCDR-280-60

Electrically operated devices for releasing weights used in drop tests, by A. R. Phillips. Sandia Corporation, Albuquerque, N. Mex. May 56. 11p. Order from LC. Mi $2.40, ph $3.30.
SCTM-100-56-51

Wind tunnel study of the influence of orifice geometry and rates on the measured pressure error of a static pressure probe at Mach 3, by G. W. Zumwalt. Sandia Corporation, Albuquerque, N. Mex. Nov 60. 24p. Order from OTS. $1.00.
SCTM-315-60(71)

Insulation-resistance and high-potential testing guide for the design engineering, by R. E. Knutson. Sandia Corporation, Albuquerque, N. Mex. Dec 60. 10p. Order from OTS. 50 cents. SCTM-376-60(71)

Cyclic pressure tests of large size pressure vessels. Progress report no. 17 covering the period from February 15 to March 16, 1960, by M. M. Lemcoe. Southwest Research Institute, San Antonio, Tex. Mar 60. Contract AT(30-1)-2140. 22p. Order from LC. Mi $2.70, ph $4.80. TID-5699

Heat transfer and critical conditions in nucleate boiling of subcooled and flowing liquids, by Y. P. Chang. University of Notre Dame, Notre Dame, Ind. [1960]. Contract AT(11-1)-785. 45p. Order from LC. Mi $3.30, ph $7.80.
TID-6045

Out-of-pile loop for helium purification testing, by R. H. Stone. General Atomic Division, General Dynamics Corporation, San Diego, Calif. Jan 60. Contract AT(04-3)-314. 15p. Order from LC. Mi $2.70, ph $4.80. TID-6341

Solid State physics program. Construction of equipment for measuring the de Haas-Van Alphen effect, by A. S. Joseph. Case Institute of Technology, Cleveland, Ohio. June 60. 25p. Order from LC. Mi $2.70, ph $4.80. TID-6393

The measurement of air flow through high efficiency filters, by C. L. Lindeken and others. University of California, Lawrence Radiation Laboratory, Livermore, Calif. Apr 60. Contract W-7405-eng-48. 12p. Order from LC. Mi $2.40, ph $3.30. UCRL-5978

Geology and Mineralogy

Preliminary studies of scavenging systems related to radioactive fallout. Summary report, by J. Rosinski and J. Stockham. Illinois nstitute of Technology, Armour Research Foundation, Chicago, Ill. Apr 60. 56p. Order from LC. Mi $3.60, ph $9.30. ARF-3127-12

Variations in the uranium-235 content of fifteen ores, by L. A. Smith. Union Carbide Nuclear Company, Division of Union Carbide Corporation, Oak Ridge Y-12 Plant, Oak Ridge, Tenn. Jan 61. Contract W-7405-eng-26. 5p. Order from OTS. 50 cents. K-1462

Variations in isotopic abundances of strontium, calcium, and argon and related topics. Seventh annual progress report for 1959. Massachusetts Institute of Technology, Cambridge, Mass. Dec 59. Contract AT(30-1)-1381. 247p. Order from LC. Mi $11.10, ph $37.80. NYO-3940

Diamond drilling in the Southern Black Hills, Fall River County, South Dakota, by R. C. Bartley. Grand Junction Operations Office, AEC, Production Evaluation Division, Denver, Colo. Oct 55. 29p. Order from OTS. 75 cents. RME-1067 (Rev.)

"Granite" exploration hole, area 15, Nevada test site, Nye County, Nevada--interim report, part B, hydrologic data, by C. E. Price. Geological Survey, Washington, D. C. Nov 59. 21p. Order from LC. Mi $2.70, ph $4.80. TEM-836-B

Isotopic geochemistry of uranium and lead. Annual report for 1959-60, by J. L. Kulp and others. Columbia University, Lamont Geological Observatory, Geochemical Laboratory, Palisades, N. Y. May 60. Contract AT(30-1)-1114. 211p. Order from LC. Mi $9.60, ph $33.30. TID-5966

Final report on radio-geology, by W. S. Broecker. Columbia University, Lamont Geological Observatory, Palisades, N. Y. June 60. Contract AT (30-1)-2364. 39p. Order from LC. Mi $3.00, ph $6.30. TID-6095

Oceanography in the Atomic Energy Commission, I. E. Wallen. Division of Biology and Medicine, Atomic Energy Commission. [1959] 17p. Order from LC. Mi $2.40, ph $3.30. TID-6309

Physical oceanography of the test area, by P. L. Horrer. Scripps Institution of Oceanography, La Jolla, Calif. May 55. Changed from OFFICIAL USE ONLY September 19, 1959. 35p. Order from LC. Mi $3.00, ph $6.30. Supersedes ITR-1068. WT-1019

Health and Safety

Preliminary studies of scavenging systems related to radioactive fallout. Summary report, by J. Rosinski and J. Stockman. Illinois Institute of Technology, Armour Research Foundation, Chicago, Ill. Apr 59. Contract AT(11-1)-626. 51p. Order from LC. Mi $3.30, ph $7.80. ARF-3127-6

Preliminary studies of scavenging systems related to radioactive fallout. Letter report no. 8 covering period June 1 to August 1, 1959, by J. Stockham and J. Rosinski. Illinois Institute of Technology, Armour Research Foundation, Chicago, Ill. Aug 59. Contract AT(11-1)-626. 7p. Order from LC. Mi $1.80, ph $1.80. ARF-3127-8

Fallout program quarterly summary report for September 1, 1960 through December 1, 1960, by E. P. Hardy, Jr. and others. United States Atomic Energy Commission, New York Operations Office, New York, N. Y. Jan 61. 182p. Order from OTS. $2.75. HASL-105

Radiological sciences department quarterly progress report on research and development activities for April through June 1952, by H. M. Parker. Hanford Works, Richland, Wash.

July 52. Decl. March 2, 1960. Contract W-31-109-eng-52. 27p. Order from LC. Mi $2.70, ph $4.80. HW-25008

Meteorological factors in the control of short-period, ground level concentrations of separations stack effluent, by J. J. Fuquay. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Dec 57. Decl. June 10, 1960. Contract W-31-109-Eng-52. 35p. Order from LC. Mi $3.00, ph $6.30. HW-54286

Off-project exposure from Hanford reactor effluent, by R. F. Foster. Hanford Atomic Products Operation, Richland, Wash. Feb 60. Contract AT(45-1)-1350. 41p. Order from OTS. $1.00. HW-63654 REV

PRTR mechanical seal pump operating experience September, 1958 through August, 1960, by P. A. Scott. Hanford Atomic Products Operation, Richland, Wash. Sep 60. Contract AT(45-1)-1350. 63p. Order from OTS. $1.75. HW-65724 REV

A study of mortality from congenital malformation for Benton County, Washington, by R. C. Henle. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Sep 60. Contract AT(45-1)-1350. 27p. Order from OTS. $1.00. HW-66344 REV

Quarterly progress report research and development activities in the field of radiological sciences April through June, 1960, by the Staff of Hanford Atomic Products Operation, Richland, Wash. Aug 60. Contract AT(45-1)-1350. 40p. Order from OTS. $1.00. HW-66306

Evaluation of radiological conditions in the vicinity of Hanford July through September 1960, by R. L. Junkins and others. Hanford Atomic Products Operation, Richland, Wash. Nov 60. Contract AT(45-1)-1350. 46p. Order from OTS. $1.00. HW-67390

Radiological services standard practice manual, by J. T. Mahar and others. Knolls Atomic Power Laboratory, Schenectady, N. Y. Aug 60. Contract W-31-109-eng-52. 145p. Order from LC. Mi $7.20, ph $22.80. KAPL-A-HP-2 (Rev. 1)

Re-evaluation of OMRE hazards with OM terphenyl as the moderator-coolant, by E. Clark and others. Atomics International Division of North American Aviation, Inc., Canoga Park, Calif. Sep 57. 29p. Order from LC. Mi $2.40, ph $3.30. NAA-SR-Memo-2055

Utilization of radioactive isotopes in coal process research, by P. M. Yavorsky and E. Gorin. Consolidation Coal Company, Research and Development Division, Library, Pa. Apr 60. Contract AT(30-)-2350. 97p. Order from OTS. $2.25. NYO-2597

Disposition of nuclear fallout debris. Annual report, by A. R. Schulert and others. Columbia University, Lamont Geological Observatory, Palisades, N. Y. Oct 60. Contract AT(30-1)-1656. 178p. Order from OTS. $2.75. NYO-9466

Environmental beta-gamma radioactivity in air at Sandia Laboratory, April through November 1958, by R. E. Womelsduff and A. Juskiewicz. Sandia Corporation, Albuquerque, N. Mex. Dec 60. 21p. Order from OTS. 75 cents. SC-4493 (RR)

Albuquerque winds aloft in relation to fallout, by C. E. Buell. Sandia Corporation, Albuquerque, N. Mex. June 56. Contract AT(29-1)-789. 14p. Order from LC. Mi $2.40, ph $3.30. SCTM-129-56-51

A pilot study of the horizontal transport of fission products in the troposphere, by R. E. Newell. Massachusetts Institute of Technology, Cambridge, Mass. May 60. Contract AT(30-1)-2241. 24p. Order from LC. Mi $2.70, ph $4.80. TID-6132

Project sunshine annual report for period October 1, 1957 to September 30, 1958. Columbia University, Lamont Geological Observatory, Palisades, N. Y. Oct 58. Contract AT(30-1)-1956. 226p. Order from LC. Mi $9.90, ph $34.80. TID-6202

Program of the United States government in atmospheric radioactivity, by G. T. Anton. U. S. Atomic Energy Commission, Washington, D. C. Nov 60. 14p. Order from OTS. 50 cents. TID-6947

Outline of courses in the department of radiation biology and Atomic Energy project, University of Rochester, by J. N. Stannard. University of Rochester, Atomic Energy Project, Rochester, N. Y. July 60. Contract W-7401-eng-40. 76p. Order from LC. Mi $4.50, ph $12.30. UR-600

Missile studies with a biological target, by V. C. Goldizen and others. Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex. Apr 60. 64p. Order from OTS. $1.50. WT-1470

Comparison test of reinforcing steels, by R. H. Carlson and J. P. Murtha. Sandia Corporation, Albuquerque, N. Mex. Oct 59. 108p. Order from OTS. $2.25. WT-1473

Instruments

Engineering design of microwave electron density measuring systems. Technical memorandum no. 78, by M. A. Heald. Princeton University, Project Matterhorn, Princeton, N. J. July 59 Contract AT(30-1)-1238. 22p. Order from LC. Mi $2.70, ph $4.80. AECU-4498

Magnetic recorder for nuclear pulse application. Final report covering period June 5, 1959 to June 5, 1960, by G. M. Burgwald and C. A. Stone. Illinois Institute of Technology, Armour Research Foundation, Chicago, Ill. June 60. Contract AT(11-1)-702. 55p. Order from LC. Mi $3.60, ph $9.30. ARF-1151-6

Use of the DD2 amplifier with the RIDL 200- and 400-channel analyzers, by H. A. Tood and R. D. Smiddie. Oak Ridge National Laboratory, Oak Ridge, Tenn. Sep 60. Contract W-7405-eng-26. 5p. Order from LC. Mi $1.80, ph $1.80. CF-60-9-107

Eddy current detection of Al-Si penetrations in canned slugs, by R. C. Robinson and J. D. Ross. Du Pont de Nemours (E. I.) & Company, Savannah River Laboratory, Aiken, S. C. Dec 57. Decl. May 4, 1960. Contract AT(07-2)-1. 14p. Order from LC. Mi $2.40, ph $3.30. DP-243

Nonlinear analogue to digital converter, by L. E. Goodwin. Du Pont de Nemours (E. I.) & Company, Savannah River Laboratory, Aiken, S. C. Aug 59. Decl. November 30, 1959. Contract AT(07-2)-1. 12p. Order from LC. Mi $2.40, ph $3.30. DP-406

Water wheel river and stream sampler, by K. J. Travers. Du Pont de Nemours (E. I.) & Company, Savannah River Laboratory, Aiken, S. C. Nov 59. Contract AT(07-2)-1. 11p. Order from LC. Mi $2.40, ph $3.30. DP-426

Plutonium monitor for puncture wounds, by G. H. Gruber. E. I. Du Pont de Nemours & Company, Savannah River Laboratory, Aiken, S. C. Dec 60. Contract AT(07-2)-1. 12p. Order from OTS. 50 cents. DP-508

An apparatus for measuring the thermal conductivity of graphite at high temperatures, by W. V. Goeddel. General Atomic Division, General Dynamics Corporation, San Diego, Calif. Jan 59. Contract AT(04-3)-314. 6p. Order from LC. Mi $1.80, ph $1.80. GAMD-1229

Operating experience with ion pumps on mass spectrometers, by V. E. Schupbach. Goodyear Atomic Corporation, Portsmouth, Ohio. Aug 60. Contract AT(33-2)-1. 12p. Order from LC. Mi $2.40, ph $3.30. GAT-T-783

Recirculating gas loop rupture monitoring, by D. C. Pound. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. June 57. Decl. June 10, 1960. Contract W-31-109-Eng-52. 11p. Order from LC. Mi $2.40, ph $3.30. HW-51032

Eddy current ultrasonic transducer, by H. L. Libby. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Aug 59. 15p. Order from LC. Mi $2.70, ph $4.80. HW-61629

A simple telephone telemeter, by C. A. Ratcliffe. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Nov 59. Contract AT(45-1)-1350. 8p. Order from LC. Mi $1.80, ph $1.80. HW-62419

Glove box integrity study, by R. A. Ciccarelli. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Mar 60. Contract AT(45-1)-1350. 23p. Order from LC. Mi $2.40, ph $3.30. HW-64258

A wrist badge film dosimeter for hand dose measurement, by P. E. Bramson. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. June 60. Contract AT(45-1)-1350. 16p. Order from LC. Mi $2.40, ph $3.30. HW-64892

A miniature beta scintillation detector, by R. A. R. Kent and E. M. Sheen. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. May 60. Contract AT(45-1)-1350. 15p. Order from LC. Mi $2.40, ph $3.30. HW-65036

L/R indicator, by G. C. Minor. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. May 60. Contract AT(45-1)-1350. 9p. Order from LC. Mi $1.80, ph $1.80. HW-65178

Scintillation alpha detection probes, by R. A. R. Kent. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Sep 60. Contract AT(45-1)-1350. 20p. Order from OTS. 50 cents. HW-66837

Gamma radiation detector and warning system, by J. B. Deal and others. The University of California, Los Alamos Scientific Laboratory, Los Alamos, N. Mex. Nov 60. Contract W-7405-ENG-36. 16p. Order from OTS 50 cents. LA-2490

Development of temperature protective circuits for the HNPF fuel channel exit, (revised), by D. E. Brown and C. L. Dunsmore. Atomics International. A Division of North American Aviation, Inc., Canoga Park, Calif. Jan 61. Contract AT(11-1)-GEN-8. 19p. Order from OTS. 50 cents. NAA-SR-5313 (REV)

Calculated sensitivity of a circulating uranium hexafluoride continuous neutron flux monitor, by J. C. Kinley. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Jan 60. 8p. Order from LC. Mi $1.80, ph $1.80. NAA-SR-Memo-4617

Mass spectrometry instrumentation. Final report and research proposal (renewal), by M. K. Testerman. University of Arkansas, Graduate Institute of Technology, Little Rock, Ark. Aug 59. Contract AT(40-1)-2123. 76p. Order from LC. Mi $4.50, ph $12.30. ORO-299

Design and construction of a unit for measuring metal skin temperatures. Phase II. Laboratory investigation and construction of development models. for the period May 1956 through November 1956, by Detroit Controls Corporation, Research Department, Redwood City, Calif. Jan 61. 26p. Order from OTS. $1.00. SC-4462 (RR)

Instrumentation of aluminum bodies to determine interior temperature variations and rate of surface recession during exposure to nuclear explosions. Phase 2: Item 7, Development of instrumentation. Phase 3: Item 2, Laboratory testing of instrumentation. Phase 4: Items 2, 3, and 4, Instrumentation of 3/4-inch thick aluminum melt plates for field testing for the period March 1957 through August 1957, by Detroit Controls Division of American-Standard, Research Department, Redwood City, Calif. Jan 61. 28p. Order from OTS. $1.00. SC-4463 (RR)

Interim report on development of design criteria for relays, for the period 1 June to 31 July 1960, by School of Electrical Engineering, Oklahoma State University, Stillwater, Oklahoma. Nov 60. 85p. Order from OTS. $2.25. SC-4519 (RR)

Salton Sea meteorological instrumentation test series Salton Sea, California conducted in September 1959, by L. E. Jones and others. Sandia Corporation, Albuquerque, N. Mex. Jan 61. 127p. Order from OTS. $2.75. SC-4521 (RR)

High-speed auto-data system for blast studies, by R. D. Jones and J. D. Smith. Sandia Corporation, Albuquerque, N. Mex. July 60. Contract AT (29-1)-789. 10p. Order from LC. Mi $1.80, ph $1.80. SCR-168

Standard test pattern for printed wiring cards, by R. P. Noble. Sandia Corporation, Albuquerque, N. Mex. May 59. 5p. Order from LC. Mi $1.80, ph $1.80. SCTM-108-55-53

Preliminary investigation of the response of pressure gauges to dust-laden air, by J. R. Banister and C. D. Broyles. Sandia Corporation, Albuquerque, N. Mex. Feb 54. 22p. Order from LC. Mi $2.70, ph $4.80. SCTM-215-53-51

"H" parameter tables, by T. E. Lommasson. Sandia Corporation, Albuquerque, N. Mex. Dec 55. 9p. Order from LC. Mi $2.70, ph $4.80. SCTM-273-55-53

Experimental evaluation of sources of variance in spectometer measurements, by W. G. Hart and L. A. Smith. Oak Ridge Gaseous Diffusion Plant, Oak Ridge, Tenn. Dec 55. Decl. March 23, 1960. 12p. Order from LC. Mi $2.40, ph $3.30. TID-5684

In-line radioactivity monitors, by G. Jansen, Jr. and others. Massachusetts Institute of Technology, Engineering Practice School, Oak Ridge, Tenn. Jan 57. 15p. Order from LC. Mi $2.40, ph $3.30. TID-6173

The channeled image intensifier. Quarterly progres ress report no. 8, by University of Chicago, Laboratories for Applied Science, Chicago, Ill. May 60. Contract AT(11-1)-647. 20p. Order from LC. Mi $2.40, ph $3.30. TID-6218

Thermal neutron detection using electromagnetic waveguides. Final report, by L. T. Ostwald and P. D. Wickersham. Ramo-Wooldridge. Division of Thompson Ramo Wooldridge Inc., Denver, Colo. May 60. Contract AT(04-3)-165. 105p. Order from LC. Mi $5.70, ph $16.80. TID-6296

Timing and firing of high explosives. Final report, by R. R. Hamilton. Edgerton, Germeshausen and Grier, Inc., Las Vegas, Nev. June 60. 32p. Order from LC. Mi $3.00, ph $6.30. TID-6353

A systematic procedure for preparing specifications on electronic instrumentation and control systems, by H. Olken. University of California, Lawrence Radiation Laboratory, Livermore, Calif. [1960]. Contract W-7405-eng-48. 60p. Order from LC. Mi $3.60, ph $9.30. UCRL-5977-T

Transistor counting systems for scintillation detectors, by S. C. Baker and others. University of California, Lawrence Radiation Laboratory, Berkeley, Calif. Feb 60. Contract W-7405-eng-48. 23p. Order from LC. Mi $2.70, ph $4.80. UCRL-9000

Nuclear materials control system (NMCS) phase II: Field testing of the fuel assay scanner, by F. J. Arsenault. Westinghouse Electric Corporation, Atomic Power Department, Pittsburgh, Pa. June 60. Contract AT(30-1)-2176. 35p. Order from LC. Mi $3.00, ph $6.30. WCAP-6042

Isotopes—Industrial Technology

Fission product applications using gaseous beta sources. Fourth quarterly progress report for December 1, 1959 to February 29, 1960, by H. S. Miller and J. H. Zufall. Air Reduction Sales Company, Central Research Laboratories, Murray Hill, N. J. 1960. Contract AT(40-1)-2343. 20p. Order from LC. Mi $2.40, ph $3.30. NYO-2606

Investigation of applications of Compton backscatter, by J. H. Tolan and W. T. McIntosh. Lockheed Nuclear Products, Lockheed Aircraft Corporation, Georgia Division, Marietta, Ga. July 60. Contract AT(30-1)-2428. 36p. Order from OTS. $1.00. NYO-2779

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Metals, Ceramics, and Materials

Structure and surface chemistry of thorium oxide, by A. L. Draper and W. O. Milligan. Rice Institute, Houston, Tex. Sep 59. Contract W-7405-eng-26. 90p. Order from LC. Mi $5.40, ph $15.30. AECU-4395

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Uranium dioxide--stainless steel specimens for irradiation in sodium--experiment PW-5-1, by G. D. Calkins and others. Battelle Memorial Institute, Columbus, Ohio. Apr 55. Decl. January 12, 1960. 19p. Order from LC. Mi $2.40, ph $3.30. BMI-X-127

Structural materials for thermal nuclear reactors operating at about 1950 F with air as a coolant, by W. Chubb and others. Battelle Memorial Institute, Columbus, Ohio. July 60. 76p. Order from LC. Mi $4.80, ph $13.80. BMI-X-159

Low volume change concrete studies, by J. H. Lancaster. Brookhaven National Laboratory, Upton, N. Y. Jan 58. 5p. Order from LC. Mi $1.80, ph $1.80. BNL-4648

Process development quarterly report for April-June 1957. Bridgeport Brass Company, Bridgeport, Conn. Nov 57. Decl. February 4, 1960. Contract AT(30-1)-1405. 80p. Order from LC. Mi $4.80, ph $13.80. BRB-39

Metallurgical investigation of the stress corrosion failure in the stainless steel clad of the S1C reactor vessel, by G. Zuromsky. Combustion Engineering, Inc., Nuclear Division, Windsor, Conn. [nd]. 21p. Order from LC. Mi $2.40, ph $3.30. CEND-78

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Fabrication of beryllium: A bibliography, by E. A. Cernak. Pratt and Whitney Aircraft Division, United Aircraft Corporation, Middletown, Conn. Apr 60. 28p. Order from LC. Mi $2.70, ph $4.80. CNLM-1802-14

Use of Monel wire tubes in the cleanup reactor filter, by M. L. Geneva and others. Goodyear Atomic Corporation, Portsmouth, Ohio. Aug 60. Contract AT(33-2)-1. 7p. Order from LC. Mi $1.80, ph $1.80. GAT-P-22

Metallurgical stability of several boride dispersion systems. Technical report, by K. C. Antony and W. V. Cummings. General Electric Company, Atomic Power Equipment Department, Pleasanton, Calif. Sep 60. Contract AT(04-3)-189. 25p. Order from OTS. 75 cents. GEAP-3530

Failure of stressed cylinders, by A. T. Taylor and L. M. Pedersen. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Mar 55. Decl. March 31, 1960. 21p. Order from LC. Mi $2.70, ph $4.80. HW-35717

Grain size study on irradiated powder metal uranium, by J. R. Morgan. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. May 55. Decl. June 10, 1960. Contract W-31-109-eng-52. 8p. Order from LC. Mi Mi $1.80, ph $1.80. HW-36453

Uranium dioxide--plutonium dioxide ceramics, by A. S. Wilson. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Mar 58. 10p. Order from LC. Mi $1.80, ph $1.80. HW-55319

Hydrogen absorption in Zircaloy-2 due to aqueous corrosion at 680°F, by D. L. Gray. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. June 58. Contract AT(45-1)-1350. 8p. Order from LC. Mi $1.80, ph $1.80. HW-56515

ETR-MTR experiments on restraint of uranium swelling by zirconium cladding, by J. W. Weber. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Apr 59. Contract AT(45-1)-1350. 16p. Order from LC. Mi $2.40, ph $3.30. HW-59941

Photographic observations of thermal effects in unirradiated uranium dioxide fuel cores, by H. W. Newkirk and J. L. Bates. General Electric Co., Hanford Atomic Products Operation, Richland, Wash. June 59. Contract AT(45-1)-1350. 12p. Order from LC. Mi $2.40, ph $3.30. HW-60828

Effects of reactor environment on candidate PRTR gas loop materials, by A. L. Bement and others. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Sep 59. Contract AT(45-1)-1350. 13p. Order from LC. Mi $2.40, ph $3.30. HW-62543

Magnetic force resistance butt welding of Zircaloy-2 fuel element closures, by L. E. Mills. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Nov 59. Contract AT(45-1)-1350. 12p. Order from LC. Mi $2.40, ph $3.30. HW-62482

The blast cleaning process as an aid to visual weld inspection, by G. R. Hanson. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Mar 60. Contract AT(45-1)-1350. 12p. Order from LC. Mi $2.40, ph $3.30. HW-64196

In-reactor creep measurements on Zircaloy-2, by L. J. Chockie. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Apr 60. 7p. Order from LC. Mi $1.80, ph $1.80. HW-64814

Twin argon welding of alsi-bonded aluminum clad uranium metal fuel elements, by T. B. Correy. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. May 60. Contract AT(45-1)-1350. 15p. Order from LC. Mi $2.40, ph $3.30. HW-65059

Aluminum alloy work at Hanford. Interim report, by H. C. Bowen. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. May 60. Contract AT(45-1)-1350. 17p. Order from LC. Mi $2.40, ph $3.30. HW-65077

Examination of an irradiated, Zircaloy-2, hot water loop tube, by A. L. Bement. Hanford Atomic Products Operation, Richland, Wash. July 60. Contract AT(45-1)-1350. 17p. Order from OTS. 50 cents. HW-65999

Zircaloy welding techniques developed for plutonium recycle program UO_2 fuel element fabrication, by L. E. Mills. Hanford Atomic Products Operation, Richland, Wash. Oct 60. Contract AT(45-1)-1350. 35p. Order from OTS. $1.00. HW-66178

Non-metallic materials evaluation for April-June 1960, by J. H. Kleinpeter. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Aug 60. Contract AT(45-1)-1350. 4p. Order from LC. Mi $1.80, ph $1.80. HW-66408

Fabrication of aluminum clad plutonium-aluminum alloy pin elements, by L. C. Lemon and W. T. Ross. Hanford Atomic Products Operation, Richland, Wash. Sep 60. Contract AT(45-1)-1350. 13p. Order from OTS. 50 cents. HW-66757

Out-of-reactor evaluation of components and assemblies - Mark I swaged UO_2 PRTR fuel element, by M. K. Millhollen. Hanford Atomic Products Operation, Richland, Wash. Sep 60. Contract AT(45-1)-1350. 23p. Order from OTS. 50 cents. HW-66910

Aqueous corrosion of aluminum-plutonium alloys, by C. H. Bloomster and Y. B. Katayama. Hanford Atomic Products Operation, Richland, Wash. Oct 60. Contract AT(45-1)-1350. 18p. Order from OTS. 50 cents. HW-67098

Melting points in the system PuO_2-UO_2, by S. W. Pijanowski and L. S. DeLuca. General Electric Company, Knolls Atomic Power Laboratory, Schenectady, N. Y. Apr 60. Contract W-31-109-Eng-52. 5p. Order from OTS. 50 cents. KAPL-1957

Availability of niobium (Columbium), by C. T. Sims. Knolls Atomic Power Laboratory, Schenectady, N. Y. Mar 60. Contract W-31-109-Eng-52. 8p. Order from LC. Mi $1.80, ph $1.80. KAPL-M-CTS-1

A study of the hardness of several USMC inconel tube welds, by W. A. Owczarski. Knolls Atomic Power Laboratory, Schenectady, N. Y. Jan 60. 14p. Order from LC. Mi $2.40, ph $3.30. KAPL-M-WAO-4

Oxidation of metals subjected to a linear temperature increase: Cubic and logarithmic laws, by J. T. Waber. Los Alamos Scientific Laboratory, Los Alamos, N. Mex. July 55. Contract W-7405-eng-36. 12p. Order from LC. Mi $2.40, ph $3.30. LA-1929

Caustic stress corrosion of type 347 stainless steel, by G. C. Wheeler and E. Howells. Knolls Atomic Power Laboratory, Schenectady, N. Y. and Babcock and Wilcox Company, Research Center, Alliance, Ohio. [195?]. 14p. Order from LC. Mi $2.40, ph $3.30. M-6911

SNAP 1--Dynamic mercury loop tests of selected materials. Period covered: January 1957--June 1959, by J. McGrew. Martin Company, Nuclear Division, Baltimore, Md. Mar 60. Contract AT (30-3)-217. 45p. Order from LC. Mi $3.30, ph $7.80. MND-P-2128

SNAP-1A fuel core materials development summary, period covered: July 1959 through June 1960. Martin Company, Nuclear Division, Baltimore, Md. 1960. Contract AT(30-3)-217. 87p. Order from LC. Mi $5.40, ph $15.30. MND-P-2349

An experimental study of intermetallic diffusion in large temperature gradients, by C. J. Meechan. Atomics International. A Division of North American Aviation, Inc., Canoga Park, Calif. Dec 60. Contract AT(11-1)-GEN-8. 17p. Order from OTS. 50 cents. NAA-SR-5357

Kinetics of hot pressing, by J. D. McClelland. Atomics International. A Division of North American Aviation, Inc., Canoga Park, Calif. Jan 61. Contract AT(11-1)-GEN-8. 21p. Order from OTS. 75 cents. NAA-SR-5591

Survey of mechanical properties data of ceramic materials, by R. Chang. Atomics International Division of North American Aviation, Inc., Canoga Park, Calif. Mar 57. 16p. Order from LC. Mi $2.40, ph $3.30. NAA-SR-Memo-1887

Thermal cycling tests on U-10 w/o Mo for the ORNL fast burst reactor, by B. Minushkin. Nuclear Development Corporation of America, White Plains, N. Y. July 60. 26p. Order from LC. Mi $2.70, ph $4.80. NDA-Memo-2136-2

Automatic de-canner--SRE fuel elements, by H. Schlein. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Oct 58. 5p. Order from LC. Mi $1.80, ph $1.80. NAA-SR-Memo-3132

Evaluation of APM M-486 welded sheet, by B. N. Briggs. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Dec 59. 5p. Order from LC. Mi $1.80, ph $1.80. NAA-SR-Memo-4836

Zirconium corrosion in polyphenyls: A literature survey, by F. L. Cochran. Atomics International Division of North American Aviation, Inc., Canoga Park, Calif. Jan 60. 27p. Order from LC. Mi $2.70, ph $4.80. NAA-SR-Memo-4847

Fabrication of OMR cylindrical prototype fuel element to be irradiated in the OMRE, by E. Garrett. Atomics International. Division of North American Aviatinn, Inc., Canoga Park, Calif. Jan 60. 22p. Order from LC. Mi $2.70, ph $4.80. NAA-SR-Memo-5007

The effect of open-air heating (1050°F) on the properties of Zircaloy-2, by R. K. Wagner. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Mar 60. 11p. Order from LC. Mi $2.40, ph $3.30. NAA-SR-Memo-5043

U_3Si_2 fuel evaluation. Part I. Oxidation characteristics, by N. R. Koenig. Atomics International Division of North American Aviation, Inc., Canoga Park, Calif. Apr 60. 9p. Order from LC. Mi $1.80, ph $1.80. NAA-SR-Memo-5199

Stability of the high temperature beta phase in beryllium and beryllium alloys, by S. H. Gelles and J. J. Pickett. Nuclear Metals, Inc., Concord, Mass. Oct 60. Contract AT(30-1)-1565. 44p. Order from OTS. $1.00. NMI-1218

Isotopic interchange in dispersion fuels, by D. S. Kneppel. Nuclear Metals, Inc., Concord, Mass. Oct 60. Contract AT(30-1)-1565. 47p. Order from OTS. $1.00. NMI-1232

Development of plutonium bearing fuel materials. Progress report for January 1 through March 31, 1960. Nuclear Materials and Equipment Corporation, Apollo, Pa. 1960. Contract AT(30-1)-2389. 36p. Order from LC. Mi $3.00. ph $6.30. NUMEC-P-20

Fuel cycle development program quarterly progress report for October 1 to December 31, 1959. Olin Mathieson Chemical Corporation, Metallurgical Laboratories, New Haven, Conn. Jan 60. Contract AT(30-1)-2374. 44p. Order from LC. Mi $3.30, ph $7.80. NYO-2685

X-ray measurement of grain size, by B. E. Warren. Massachusetts Institute of Technology, Cambridge, Mass. June 60. Contract AT(30-1)-858. 7p. Order from LC. Mi $1.80, ph $1.80. NYO-4836

Imperfections in metals. The early stages of plastic deformation in copper. Technical report no. 24, by D. A. Thomas and B. L. Averbach. Massachusetts Institute of Technology, Cambridge, Mass. May 58. 29p. Order from LC. Mi $2.70, ph $4.80. NYO-7081

Fuel element development program for the pebble bed reactor. Quarterly progress report for November 1, 1959 to January 31, 1960. Sanderson and Porter, New York, N. Y. Jan 60. Contract AT(30-1)-2378. 26p. Order from LC. Mi $2.70, ph $4.80. NYO-9057

Fuel element development program for the pebble bed reactor. A topical report on subsurface coatings for fueled graphite spheres, by Sanderson and Porter, New York, N. Y. June 60. Contract AT(30-1)-2378. 11p. Order from OTS. 50 cents. NYO-9060

Metallurgy division quarterly progress report for period ending October 31, 1952, by W. H. Bridges. Oak Ridge National Laboratory, Oak Ridge, Tenn. 1952. Decl. with deletions October 29, 1959. Contract W-7405-eng-26. 48p. Order from LC. Mi $3.30, ph $7.80. ORNL-1437(Del.)

Aircraft nuclear propulsion project quarterly progress report for period ending June 10, 1954. Oak Ridge National Laboratory, Oak Ridge, Tenn. July 54. Decl. with deletions November 12, 1959. Contract W-7405-eng-26. 114p. Order from LC. Mi $6.00, ph $18.30. ORNL-1729 (Del.)

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Corrosion resistance of various ceramics and cermets to liquid metals, by W. H. Cook. Oak Ridge National Laboratory, Oak Ridge, Tenn. June 60. Contract W-7405-eng-26. 27p. Order from LC. Mi $2.70, ph $4.80. ORNL-2391

Papers presented at ANP materials meeting November 16-18, 1954, Wright Air Development Center, Dayton, Ohio. Oak Ridge National Laboratory, Oak Ridge, Tenn. Mar 59. Decl. May 9, 1960. Contract W-7405-eng-26. 168p. Order from LC. Mi $7.80, ph $25.80. ORNL-2685

Fuel cycle development program. Quarterly progress report for May 1, 1959 to August 1, 1959, National Carbon Company, Fostoria, Ohio. Sep 59. Contract AT(40-1)-2560. 15p. Order from LC. Mi $2.40, ph $3.30. ORO-244

Fuel-bearing fiberglas in aluminum base fuel elements. Third quarterly report for November 1, 1959 to January 31, 1960, by R. H. Baskey. Clevite Corporation, Mechanical Research Division, Cleveland, Ohio. Feb 60. Contract AT (40-1)-2557. 20p. Order from LC. Mi $2.40, ph $3.30. ORO-273

Fuel bearing fiberglas in aluminum base fuel elements. Monthly progress letter no. 10 for March 1, 1960 to March 31, 1960, by R. H. Baskey. Clevite Corporation, Mechanical Research Division, Cleveland, Ohio. Apr 60. Contract AT (40-1)-2557. 4p. Order from LC. Mi $1.80, ph $1.80. ORO-274

Synthesis and fabrication of refractory uranium compounds. Monthly progress report no. 6 for January through January 31, 1960, by K. M. Taylor and others. Carborundum Company, Niagara Falls, N. Y. Feb 60. Contract AT(40-1)-2558. 7p. Order from LC. Mi $1.80, ph $1.80. ORO-275

Fuel bearing fiberglas in aluminum base fuel elements. Monthly progress letter no. 13 for the period June 1, 1960 to June 30, 1960, by R. H. Baskey. Clevite Corporation, Mechanical Research Division, Cleveland, Ohio. July 60. Contract AT(40-1)-2557. 5p. Order from LC. Mi $1.80, ph $1.80. ORO-304

Dispersion type materials for fuel elements. Part II. Uranium carbide and uranium sulfide dispersion materials, by I. Sheinhartz. Sylvania-Corning Nuclear Corporation, Bayside, N. Y. Mar 59. Decl. May 13, 1960. Contract AT-30-[1]-GEN-366. 16p. Order from LC. Mi $2.40, ph $3.30. SCNC-273

Isostatic pressing of UO_2 in high temperature metals, by I. Sheinhartz and J. Fugardi. Sylvania-Corning Nuclear Corporation, Bayside, N. Y. Sep 60. Contract AT-30-1-GEN-366. 17p. Order from OTS. 50 cents. SCNC-312

Properties of refractory nuclear materials, by M. Comstock. Brookhaven National Laboratory, Upton, N. Y. Feb 60. 18p. Order from LC. Mi $2.40, ph $3.30. TID-3906

The corrosion of HyMu 80 fluorinators, by F. W. Fink. Battelle Memorial Institute, Columbus, Ohio. May 60. 28p. Order from LC. Mi $3.00, ph $6.30. TID-5935

Measurement of electric field gradients in dilute silver alloys by angular correlation techniques. Thesis, by C. A. Giffels. Carnegie Institute of Technology, Pittsburgh, Pa. May 60. Contract AT(30-1)-1830. 91p. Order from LC. Mi $5.40, ph $15.30. TID-6069

Informal letter progress report for May 1960. Sylvania-Corning Nuclear Corporation, Bayside, N. Y. 1960. 10p. Order from LC. Mi $1.80, ph $1.80. TID-6084

A compilation of data on the effect of high-pressure hydrogen on the mechanical properties of metals, by H. Stromberg. University of California, Lawrence Radiation Laboratory, Livermore, Calif. Sep 58. Contract W-7405-eng-48. 16p. Order from LC. Mi $2.40, ph $3.30. UCRL-5350

Crystallography of some of the transition element beryllides, by A. Zalkinaand D. E. Sands. University of California, Lawrence Radiation Laboratory, Livermore, Calif. May 60. 6p. Order from LC. Mi $1.80, ph $1.80. UCRL-5988-T

Some properties of vanadium group beryllides, by O. H. Kriborian. University of California. Lawrence Radiation Laboratory, Livermore, Calif. May 60. 9p. Order from LC. Mi $1.80, ph $1.80. UCRL-5989-T

Phase diagrams of zirconium-beryllium and related systems, by R. G. Bedford. University of California, Lawrence Radiation Laboratory, Livermove, Calif. May 60. 7p. Order from LC. Mi $1.80, ph $1.80. UCRL-5991-T

Fission fragment damage to crystal structures, by R. M. Berman and others. Westinghouse Electric Corporation, Bettis Atomic Power Laboratory, Pittsburgh, Pa. Feb 60. Contract AT-11-1-GEN-14. 32p. Order from LC. Mi $3.00, ph $6.30. WAPD-T-1125

Zirconium highlights. Westinghouse Electric Corporation, Bettis Atomic Power Laboratory, Pittsburgh, Pa. Mar 60. Contract AT-11-1-GEN-14. 26p. Order from LC. Mi $2.70, ph $4.80. WAPD-ZH-23

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Nuclear Explosions—Peaceful Applications

Supplementary report on geologic investigations in support of Phase II, project Chariot in the vicinity of Cape Thompson, Northwestern Alaska, by R. Kachadoorian and others. Geological Survey, Washington, D. C. June 60. 33p. Order from LC. Mi $3.00, ph $6.30. TEI-764

Application of nuclear explosions as seismic sources, by G. W. Johnson. University of California, Lawrence Radiation Laboratory, Livermore, Calif. July 60. 51p. Order from OTS. $1.50. UCRL-6030-T

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Cosmotron magnet power supply, by G. K. Green. Brookhaven National Laboratory, Upton, N. Y. July 54. 32p. Order from LC. Mi $3.00, ph $6.30. BNL-4632

Orbit considerations in the linear accelerator, by L. Smith. Brookhaven National Laboratory, Upton, N. Y. May 56. 31p. Order from LC. Mi $3.00, ph $6.30. BNL-4635

Long-term vertical pile load tests, by J. H. Lancaster. Brookhaven National Laboratrry, Upton, N. Y. May 56. 5p. Order from LC. Mi $2.40, ph $3.30. BNL-4636

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Beat factors and stopband widths, by E. D. Courant. Brookhaven National Laboratory, Upton, N. Y. Jan 57. 13p. Order from LC. Mi $2.40, ph $3.30. BNL-4641

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Beam observation electrodes for the AGS, by E. C. Raka. Brookhaven National Laboratory, Upton, N. Y. Mar 57. 9p. Order from LC. Mi $1.80, ph $1.80. BNL-4643

Linac tuning system, by J. D. Kiesling. Brookhaven National Laboratory, Upton, N. Y. July 57. 17p. Order from LC. Mi $2.40, ph $3.30. BNL-4645

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Magnet support system, by V. J. Buchanan. Brookhaven National Laboratory, Upton, N. Y. Jan 58. 4p. Order from LC. Mi $1.80, ph $1.80. BNL-4647

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Ripple filtering for amain AGS magnet generator, by J. G. Cottingham. Brookhaven National Laboratory, Upton, N. Y. June 58. 4p. Order from LC. Mi $2.40, ph $3.30. BNL-4650

Modes in long cavities, by J. D. Kiesling. Brookhaven National Laboratory, Upton, N. Y. Apr 59. 6p. Order from LC. MI $1.80, ph $1.80 BNL-4652

Tentative plans for experimental equipment at the AGS, by R. L. Cool and E. D. Courant. Brookhaven National Laboratory, Upton, N. Y. Apr 59. 11p. Order from LC. Mi $2.40, ph $3.30. BNL-4653

The focal properties of certain quadrupole lenses, by J. P. Blewett. Brookhaven, National Laboratory, Upton, N. Y. May 59. 32p. Order from LC. Mi $3.00, ph $6.30. BNL-4654

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The dynamic K-meter, by J. P. Palmer. Brookhaven National Laboratory, Upton, N. Y. June 59. 23p. Order from LC. Mi $2.70, ph $4.80. BNL-4657

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High current pulsed electron accelerator, by N. Christolflos. University of California, Lawrence Radiation Laboratory, Livermore, Calif. June 60. Contract W-7405-eng-48. 5p. Order from LC. Mi $1.80, ph $1.80. UCRL-5951-T

Bevatron operation and development. XXVI May, June, July 1960, by W. D. Hartsough. University of California, Lawrence Radiation Laboratory, Berkeley, Calif. Sep 60. Contract W-7405-eng-48. 16p. Order from OTS. 50 cents. UCRL-9418

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Table of energy levels of asymmetric even nuclei with beta-vibration-rotation interaction, by P. P. Day and others. Argonne National Laboratory, Argonne, Ill. Nov 60. Contract W-31-109-eng-38. 22p. Order from OTS. 50 cents. ANL-6220

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A pulsed neutron source technique, by R. Siems and M. Melissaropoulos. Argonne National Laboratory, Argonne, Ill. Nov. 60. Contract W-31-109-eng-38. 32p. Order from OTS. 75 cents. ANL-6254

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Dynamic analysis of a pneumatic amplifier, by B. Kaplan and J. A. Delaney. General Electric Company, Aircraft Nuclear Propulsion Department, Cincinnati, Ohio. July 60. Contracts AT(11-1)-171 and AF33(600)-38062. 47p. Order from OTS. $1.25. APEX-576

A simple experimental method for determining effective threshold energies and cross sections, by R. G. Jung and others. Battelle Memorial Institute, Columbus, Ohio. Dec 60. Contract W-

7405-eng-92. 29p. Order from OTS. 75 cents. BMI-1486

Nuclear characteristics of cylindrical breeder reactors containing thorium in pellet form, by D. R. Vondy. Oak Ridge National Laboratory, Oak Ridge, Tenn. May 60. Contract W-7405-eng-26. 17p. Order from LC. Mi $2.40, ph $3.30. CF-60-5-11

Design procedure for a minimum weight space radiator, by R. J. Hefner. Oak Ridge National Laboratory, Oak Ridge, Tenn. Aug 60. 26p. Order from LC. Mi $2.70, ph $4.80. CF-60-8-21

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Dynamics of compressible fluids, by F. H. Harlow. University of California. Los Alamos Scientific Laboratory, Los Alamos, N. Mex. Apr 60. Contract W-7405-ENG-36. 200p. Order from OTS. $3.00. LA-2412

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Snap I mercury boiler development, January 1957 to June 1959, by J. Jicha and J. J. Keenan. Martin Company, Nuclear Division, Baltimore, Md. June 60. Contract AT(30-3)-217. 102p. Order from OTS. $2.25. MND-P-2309

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NAA-SR-4531

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NYO-2501

Measurement of the spin of arsenic^{76} by the atomic beam method, by R. L. Christensen. Princeton University, Palmer Physical Laboratory, New York, N. Y. Aug 57. Contract AT(30-1)-937. 206p. Order from LC. Mi $9.30, ph $31.80.
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NYO-9085

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ORNL-2963

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ORNL-2990

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ORNL-3016

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ORNL-3017

Maximum missile ranges from cased explosive charges, by R. H. Bishop. Sandia Corporation. Albuquerque, N. Mex. July 58. 56p. Order from LC. Mi $3.60, ph $9.30.
SC-4205 (TR)

Leakage from pressurized containers during long term storage, by A. N. Blackwell. Sandia Corporation, Albuquerque, N. Mex. Jan 61. Contract AT(29-1)-789. 23p. Order from OTS. 50 cents.
SCTM-29-60-81

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Studies on millimeter wave generation. Technical report no. 4, by B. W. Hakki. University of Illinois, Electrical Engineering Research Laboratory, Urbana, Ill. Aug 60. Contract AT(11-1)-392. 116p. Order from LC. Mi $6.00, ph $18.30. TID-6200

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Diffusion of radioactive gases through power reactor graphite, by H. L. Weissberg and A. S. Berman. Oak Ridge Gaseous Diffusion Plant, Oak Ridge, Tenn. Apr 59. Contract W-7405-eng-26. 19p. Order from LC. Mi $2.40, ph $3.30. TID-6678

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Variation with electron temperature of the intensity ratio of a pair of helium spectral lines, by J. C. Howard. University of California, Lawrence Radiation Laboratory, Livermore, Calif. June 58. Contract W-7405-eng-48. 16p. Order from LC. Mi $2.40, ph $3.30. UCRL-5265

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SLOP-1-A thermal multigroup program for the IBM-704, by H. Bohl and others. Westinghouse Electric Corporation, Bettis Atomic Power Plant, Pittsburgh, Pa. Oct 60. Contract AT-11-1-GEN-14. 151p. Order from OTS. $3.00.
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KATE-1. A program for calculating Wigner-Wilkins and Maxwellian averaged thermal constants on the Philco-2000, by H. J. Amster and J. B. Callaghan. Westinghouse Electric Corporation, Bettis Atomic Power Laboratory, Pittsburgh, Pa. Oct 60. Contract AT-11-1-GEN-14. 57p. Order from OTS. $1.75. WAPD-TM-232

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CF-52-3-172

Thorium oxide slugs, by R. M. Carroll. Oak Ridge National Laboratory, Oak Ridge , Tenn. Apr 55. Decl. July 2, 1957. 9p. Order from LC. Mi $1.80, ph $1.80. CF-55-4-162

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DP-298

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Fretting corrosion irradiation tests, by M. K. Millhollen. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Sep 58. 9p. Order from LC. Mi $1.80, ph $1.80. HW-61821

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Effect of radiation on dynamic properties of high polymers. Progress report for July 1, 1959 to June 30, 1960, by J. A. Sauer and A. E. Woodward. Pennsylvania State University, University Park, Pa. July 60. Contract AT(30-1)-1858. 27p. Order from LC. Mi $2.70, ph $4.80.
TID-6197

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EBWR test report, by V. M. Kolba. Argonne National Laboratory, Argonne, Ill. Nov 60. Contract W-31-109-eng-38. 444p. Order from OTS. $5.00. ANL-6229

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SM-2 critical experiments--CE-1, by J. W. Noaks and others. Alco Products, Inc., Schenectady, N. Y. Nov 59. Contract AT(30-3)-326. 180p. Order from LC. MI $8.40, ph $28.80. APAE-54

SM-1 reactor core inspection at 2/3 core life. Period covered March 7, 1959 to May 17, 1959, by B. J. Byrne and others. Alco Products, Inc., Schenectady, N. Y. Jan 60. Contract AT(30-3)-326. 171p. Order from LC. Mi $6.90, ph $21.30. APAE-55

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Wilcox Company, Atomic Energy Division, Lynchburg, Va. Aug 60. Contract AT(30-3)-274. 40p. Order from LC. Mi $3.00, ph $6.30. BAW-1204

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CF-57-11-3 (Rev. 1)

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ORNL 20 MTR in pile loop instrumentation, by R. G. Affel. Oak Ridge National Laboratory, Oak Ridge, Tenn. Oct 58. Contract W-7405-eng-26. 53p. Order from LC. Mi $3.60, ph $9.30. CF-58-10-55

Survey of low enrichment molten-salt reactors, by H. G. MacPherson. Oak Ridge National Laboratory, Oak Ridge, Tenn. Oct 58. 8p. Order from LC. Mi $1.80, ph $1.80. CF-58-10-60

Inspection and maintenance experience with HRE-2, by J. S. Culver and others. Oak Ridge National Laboratory, Oak Ridge, Tenn. Dec 58. 23p. Order from LC. Mi $2.70, ph $4.80.
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Fuel cycle costs in a graphite moderated slightly enriched fused salt reactor, by C. E. Guthrie. Oak Ridge National Laboratory, Oak Ridge, Tenn. Feb 59. 7p. Order from LC. Mi $1.80, ph $1.80. CF-59-1-13 (Rev.)

Prediction of thermal-neutron fluxes in the bulk shielding facility from lid tank shielding facility data, by A. D. MacKellar. Oak Ridge National Laboratory, Oak Ridge, Tenn. Jan 59. 35p. Order from LC. Mi $3.00, ph $6.30.
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Calculation of radial neutron-flux distribution in EGCR lattice cell, by T. K. DeBoer. Oak Ridge National Laboratory, Oak Ridge, Tenn. Aug 59. 8p. Order from LC. Mi $1.80, ph $1.80.
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Feasibility study--use of small diameter wires in UO_2 pellets for in pile temperature monitoring, by R. E. Meadows and W. C. Thurber. Oak Ridge National Laboratory, Oak Ridge, Tenn. Oct 59. Contract W-7405-eng-26. 55p. Order from LC. Mi $3.60, ph $9.30. CF-59-10-7

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CF-59-11-134

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Nuclear characteristics of BeO-moderated cores vs graphite moderated cores, by R. S. Carlsmith Oak Ridge National Laboratory, Oak Ridge, Tenn. Jan 60. 10p. Order from LC. Mi $2.40, ph $3.30. CF-60-1-43

Thorium breeder reactor study: Optimization of a blanket processing cycle to obtain minimum total inventory in a chemical reprocessing cycle, by W. L. Carter. Oak Ridge National Laboratory, Oak Ridge, Tenn. Jan 60. Contract W-7405-eng-26. 28p. Order from LC. Mi $2.70, ph $4.80. CF-60-1-63

2G-2R spherical reactor code for the IBM-704, by T. B. Fowler. Oak Ridge National Laboratory, Oak Ridge, Tenn. Jan 60. 19p. Order from LC. Mi $2.40, ph $3.30. CF-60-1-100

Statistical analysis of small power oscillations in the HRT, by J. Hirota. Oak Ridge National Laboratory, Oak Ridge, Tenn. Jan 60. 31p. Order from LC. Mi $3.00, ph $6.30. CF-60-1-107

Protactinium losses in a BeO moderated reactor, by R. S. Carlsmith. Oak Ridge National Laboratory, Oak Ridge, Tenn. Jan 60. 8p. Order from LC. Mi $1.80, ph $1.80. CF-60-1-108

Xenon control in fluid fueled reactors, by W. D. Burch and others. Oak Ridge National Laboratory, Oak Ridge, Tenn. July 60. 33p. Order from LC. Mi $3.30, ph $6.30. CF-60-2-2

Hazards of nuclear power units in space applications, by P. G. Lafyatis. Oak Ridge National Laboratory, Oak Ridge, Tenn. Feb 60. Contract W-7405-eng-26. 7p. Order from LC. Mi $1.80, ph $1.80. CF-60-2-18

Observed heat transfer in HRT fuel and blanket heat exchangers, by P. N. Haubenreich and others. Oak Ridge National Laboratory, Oak Ridge, Tenn. Feb 60. 15p. Order from LC. Mi $2.40, ph $3.30. CF-60-2-30

A study of the fuel value of plutonium, by S. Jaye and others. Oak Ridge National Laboratory, Oak Ridge, Tenn. Feb 60. 90p. Order from LC. Mi $4.80, ph $13.80. CF-60-2-34

Natural circulation burn out heat flux for the ORR, by J. F. Wett, Jr. Oak Ridge National Laboratory, Oak Ridge, Tenn. Feb 60. 23p. Order from LC. Mi $2.70, ph $4.80. CF-60-2-61

Numerical three dimensional temperature analysis of the EGCR fuel rod, by L. G. Epel. Oak Ridge National Laboratory, Oak Ridge, Tenn. Mar 60. Contract W-7405-eng-26. 16p. Order from LC. Mi $2.40, ph $3.30. CF-60-3-1

Procedure for testing reactor controls pulse amplifiers and preamplifier, by J. L. Anderson. Oak Ridge National Laboratory, Oak Ridge, Tenn. Mar 60. 11p. Order from LC. Mi $2.40, ph $3.30. CF-60-3-3

Effects of fast neutron reactions in the beryllium reflector of the HFIR, by H. C. Claiborne. Oak Ridge National Laboratory, Oak Ridge, Tenn. May 60. 16p. Order from LC. Mi $2.40, ph $3.30. CF-60-3-10

Preliminary hot spot analysis of the HFIR, by N. Hilvety. Oak Ridge National Laboratory, Oak Ridge, Tenn. Mar 60. 42p. Order from LC. Mi $3.30, ph $7.80. CF-60-3-12

Summary of HRT run 16, by J. R. Engel and others. Oak Ridge National Laboratory, Oak Ridge, Tenn. Apr 60. Contract W-7405-eng-26. 68p. Order from LC. Mi $3.90, ph $10.80. CF-60-4-4

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Events preceding the large power excursion on November 2, 1959, by P. N. Haubenreich. Oak Ridge National Laboratory, Oak Ridge, Tenn. May 60. Contract W-7405-eng-26. 7p. Order from LC. Mi $1.80, ph $1.80. CF-60-5-18

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Analog computer study of the MSR-ORR in pile pressurized water loop no. 1, by S. J. Ball. Oak Ridge National Laboratory, Oak Ridge, Tenn. May 60. 12p. Order from LC. Mi $2.40, ph $3.30. CF-60-5-50

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An investigation of the structural integrity of selected components of the Oak Ridge Research reactor, by J. M. Corum and others. Oak Ridge National Laboratory, Oak Ridge, Tenn. July 60. Contract W-7405-eng-26. 48p. Order from LC. Mi $3.30, ph $7.80. CF-60-5-109

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Shielding of pipes in the HFIR primary coolant system, by H. A. McLain and L. A. Haack. Oak Ridge National Laboratory, Oak Ridge, Tenn. June 60. Contract W-7405-eng-26. 31p. Order from LC. Mi $3.00, ph $6.30. CF-60-6-123

APPR-1 Startup analysis, by R. S. Stone. Oak Ridge National Laboratory, Oak Ridge, Tenn. July 60. Contract W-7405-eng-26. 5p. Order from LC. Mi $1.80, ph $1.80. CF-60-7-50

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Oxygen scavenger studies with hydrazine in high pH systems. Interim report, by L. D. Perrigo, Jr. and T. F. Demitt. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Jan 59. 7p. Order from LC. Mi $1.80, ph $1.80. HW-58932

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PRTR fuel element nuclear safety, by N. Ketzlach. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Mar 59. Contract AT(45-1)-1350. 5p. Order from LC. Mi $1.80, ph $1.80. HW-59786

Shielding of PRTR gas loop and filter, by J. J. Regimbal. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Apr 59. 15p. Order from LC. Mi $2.40, ph $3.30. HW-60101

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Hydraulic system flow decay relations during loss of external power, by W. J. Love. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Feb 60. 54p. Order from LC. Mi $3.60, ph $9.30. HW-62846

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PCTR measurements of the EGCR lattice parameters, by P. F. Nichols and others. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Mar 60. Contract AT(45-1)-1350. 16p. Order from LC. Mi $2.40, ph $3.30. HW-63768

Study report. High speed data acquisition system for PRTR, by R. G. Clark. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Jan 60. Contract AT(45-1)-1350. 7p. Order from LC. Mi $1.80, ph $1.80. HW-63789

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Reamed rear face parker fitting, by P. B. McCarthy General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Mar 60. Contract AT(45-1)-1350. 12p. Order from LC. Mi $2.40, ph $3.30. HW-64310

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Lattice calculations using the IBM-704 Wanda-2-diffusion code, by W. O. Allen and others. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Aug 57. 8p. Order from LC. Mi $1.80, ph $1.80. NAA-SR-Memo-2033

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OMR nuclear parameter survey , by W. W. Davis and W. D. Leggett. Atomics International. A Division of North American Aviation, Inc., Canoga Park, Calif. Aug 57. 27p. Order from LC. Mi $2.70, ph $4.80. NAA-SR-Memo-2073

Strain gage installation on main secondary sodium system of SRE, by L. P. Inglis. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Aug 57. 20p. Order from LC. Mi $2.70, ph $4.80. NAA-SR-Memo-2077

Reflector control of OMR, by W. W. Davis. Atomics International. A Division of North American Aviation, Inc., Canoga Park, Calif. Oct 57. 5p. Order from LC. Mi $1.80, ph $1.80. NAA-SR-Memo-2177

Maintenance procedure for SRE main primary sodium pump, by H. Strahl and H. Chapman. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Oct 57. 11p. Order from LC. Mi $2.40, ph $3.30. NAA-SR-Memo-2201

An electronic circuit design for providing an indication when the Mark II safety rods are released from the holding magnet, by R. J. Hall. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Oct 57. 5p. Order from LC. Mi $1.80, ph $1.80. NAA-SR-Memo-2207

Thermal stresses from radial exponential heat generator in the thermal shields, vessel wall and biological shield, by C. O. Peinado. Atomics Internatinnal. A Division of North American Aviation, Inc., Canoga Park, Calif. Oct 57.

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NAA-SR-Memo-2213

Organic energy absorption in OMRE and in metal and UO_2 fueled OMR, by V. Keshishian. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. May 58. 16p. Order from LC. Mi $2.40, ph $3.30.
NAA-SR-Memo-2484

Preliminary estimates of radioactivity in process wastes from SENN 150 EMW organic reactor, by A. R. Piccot. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Mar 58, 10p. Order from LC. Mi $2.40, ph $3.30. NAA-SR-Memo-2526

SRE experimental Scram data November 20, 1957, by K. W. Foster. Atomics International. A Division of North American Aviation, Inc., Canoga Park, Calif. Mar 58. 17p. Order from LC. Mi $2.40, ph $3.30.
NAA-SR-Memo-2578

Thermal neutron source distribution in an OMR unit cell, by W. D. Leggett. Atomics International. A Division of North American Aviation, Inc., Canoga Park, Calif. Apr 58. 6p. Order from LC. Mi $1.80, ph $1.80.
NAA-SR-Memo-2648

A blackness measurement of an S.R.E. fuel cluster, by J. W. Zink and W. A. Horning. Atomics International. A Division of North American Aviation, Inc., Canoga Park, Calif. May 58. 9p. Order from LC. Mi $1.80, ph $1.80.
NAA-SR-Memo-2711

HNPF plant heat balances for a design gross load of 86 eMW, by T. L. Gershun. Atomics International. A Division of North American Aviation, Inc., Canoga Park, Calif. June 58 20p. Order from LC. Mi $2.70, ph $4.80.
NAA-SR-Memo-2763

Design of an eddy-current brake for a sodium-cooled nuclear power reactor, by R. S. Baker. Atomics International. A Division of North American Aviation, Inc., Canoga Park, Calif. July 58. 17p. Order from LC. Mi $2.40, ph $3.30.
NAA-SR-Memo-2881

Cask indexing using closed circuit television, by M. L. Peelgren. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Aug 58. 5p. Order from LC. Mi $1.80, ph $1.80. NAA-SR-Memo-2930

Reactor burnup of poisons in commercial graphites, by S. C. Carniglia. Atomics International. A Division of North American Aviation, Inc., Canoga Park, Calif. Sep 58. 20p. Order from LC. Mi $2.40, ph $3.30.
NAA-SR-Memo-3092

SRE nitrogen gallery seal, by R. P. Nebiker. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Aug 58. 7p. Order from LC. Mi $1.80, ph $1.80.
NAA-SR-Memo-3105

Converting data from the water test loop to sodium, by R. D. Welsh. Atomics International. A Division of North American Aviation, Inc., Canoga Park, Calif. Oct 58. 9p. Order from LC. Mi $1.80, ph $1.80. NAA-SR-Memo-3128

Neutron and gamma flux survey of the SRE instrument thimbles, by H. F. Donohue. Atomics International. A Division of North American Aviation, Inc., Canoga Park, Calif. Oct 58. 14p. Order from LC. Mi $2.40, ph $3.30.
NAA-SR-Memo-3131

Design and fabrication of SRE core heater protective tubes, by R. L. Shelby. Atomics International. A Division of North American Aviation, Inc., Canoga Park, Calif. Oct 58. 6p. Order from LC. Mi $1.80, ph $1.80.
NAA-SR-Memo-3134

Reactivity of MC-2-2 in the SRE, by R. W. Woodruff. Atomics International. A Division of North American Aviation, Inc., Canoga Park, Calif. Oct 58. 5p. Order from LC. Mi $1.80, ph $1.80. NAA-SR-Memo-3142

PIQUA-OMR neutron detector shielding, by D. S. Duncan. Atomics International. A Division of North American Aviation, Inc., Canoga Park, Calif. Nov 58. 13p. Order rrom LC. Mi $2.40, ph $3.30. NAA-SR-Memo-3343

Fuel burn-up study of the U-Moly. Fueled Hallam reference core, by K. J. Doyas. Atomics International. A Division of North American Aviation, Inc. Canoga Park, Calif. Jan 59. 6p. Order from LC. Mi $1.80, ph $1.80.
NAA-SR-Memo-3520

Expanded scale temperature recorder, by R. W. Madsen. Atomics International. Division of North American Avaition, Inc., Canoga Park, Calif. Jan 59. 4p. Order from LC. Mi $1.80, ph $1.80. NAA-SR-Memo-3522

Reactivity of a Zircaloy II thimble in the SRE, R. W. Woodruff. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Jan 59. 9p. Order from LC. Mi $1.80, ph $1.80. NAA-SR-Memo-3523

Multigroup analysis of neutron flux and current changes in a reactor due to a "slab" control rod, by R. L. Moore. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Feb 59. 12p. Order from LC. Mi $2.40, ph $3.30. NAA-SR-Memo-3535(Rev.)

Radiological hazards of calandria core removal, by W. P. Kunkel. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Mar 59. 12p. Order from LC. Mi $2.40, ph $3.30. NAA-SR-Memo-3654

Piqua OMR-spacing of cavity liner cooling pipes, by S. Yee. Atomics International. A Division of North American Aviation, Inc., Canoga Park, Calif. Apr 59. 10p. Order from LC. Mi $2.40, ph $3.30. NAA-SR.Memo-3735

SRE-Edison plant control system, by R. J. Hall. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Apr 59. 28p. Order from LC. Mi $2.70, ph $4.80. NAA-SR-Memo-3760

Television monitor--SRE fuel coffin, by D. K. Darley and J. D. Smith. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. May 69. 7p. Order from LC. Mi $1.80, ph $1.80. NAA-SR-Memo-3844

Plux distribution measurements in OMR cores, by V. A. Swanson. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. May 59. 14p. Order from LC. Mi $2.40, ph $3.30. NAA-SR-Memo-3872

Conceptual design study of OMRE modifications, by W. B. Wolfe. Atomics International. A Division of North American Aviation, Inc., Canoga Park, Calif. July 59. 53p. Order from LC. Mi $3.60, ph $9.30. NAA-SR-Memo-3881

Fabrication and inspection techniques for the SRE alternate calandria core, by C. L. Peckinpaugh. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. May 59. 18p. Order from LC. Mi $2.40, ph $3.30. NAA-SR-Memo-3920

Radial statistical weight for the SRE, by R. W. Woodruff. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. May 59. 4p. Order from LC. Mi $1.80, ph $1.80. NAA-SR-Memo-3934

Analysis of OMRE waste gas, by H. M. Gilroy. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Jan 60. 23p. Order from LC. Mi $2.70, ph $4.80. NAA-SR-Memo-4130

Activation analysis of closed circuit shield cooling water, by W. A. Rhoades. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Oct 59. 14p. Order from LC. Mi $2.40, ph $3.30. NAA-SR-Memo-4214

Closed circuit cooling water purification system, by H. O. Charnock. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Aug 59. 9p. Order from LC. Mi $1.80, ph $1.80. NAA-SR-Memo-4235

Summary of creep tests on the Piqua OMR flat-plate fuel element, by C. R. Davidson and S. Bain. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Aug 59. 23p. Order from LC. Mi $2.70, ph $4.80. NAA-SR-Memo-4259

Cooling of Piqua OMR source element, by D. J. McGoff. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Aug 59. 12p. Order from LC. Mi $2.40, ph $3.30. NAA-SR-Memo-4296

Power flow comparator. 2nd interim report, by H. Schlein. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Aug 59. 6p. Order from LC. Mi $1.80, ph $1.80. NAA-SR-Memo-4302

Calculation of the temperature distribution in the HNPF moderator can, by W. H. East. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Oct 59. 6p. Order from LC. Mi $1.80, ph $1.80. NAA-SR-Memo-4310

Development test of the HNPF hangerrod disconnect-latches and disconnect actuator, by M. L. Pelgren. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Dec 59. 17p. Order from LC. Mi $2.40, ph $3.30. NAA-SR-Memo-4335

Piqua OMR plant steady-state control program, by W. Kushan. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Oct 59. 14p. Order from LC. Mi $2.40, ph $3.30. NAA-SR-Memo-4341

Load-deflection tests of HNPF reactor vessel bellows, by G. M. Merritt. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Sep 59. 9p. Order from LC. Mi $1.80, ph $1.80. NAA-SR-Memo-4346

Temperature distribution in region of fuel slug end, by D. J. McGoff. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Sep 59. 6p. Order from LC. Mi $1.80, ph $1.80. NAA-SR-Memo-4347

Flash distillation of synthetic OMRE coolant, by J. W. Florence. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Oct 59. 9p. Order from LC. Mi $1.80, ph $1.80. NAA-SR-Memo-4420

Preliminary fuel burnup study of the 255 MWE ASGR, by A. L. Aronson. Atomics Internation. Division of North American Aviation, Inc., Canoga Park, Calif. Oct 59. 14p. Order from LC. Mi $2.40, ph $3.30. NAA-SR-Memo-4455

Further nuclear calculations on the 255 MWE advanced SGR, by A. L. Aronson. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Oct 59. 26p. Order from LC. Mi $2.70, ph $4.80. NAA-SR-Memo-4461

Evaluation of HNPF mark B drive, by P. F. Shaw. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Oct 59. 15p. Order from LC. Mi $2.40, ph $3.30. NAA-SR-Memo-4514

OMR Piqua waste gas treatment system, prototype system description and experimental program, by H. M. Gilroy and J. H. Wilson. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Nov 59. 9p. Order from LC. Mi $1.80, ph $1.80. NAA-SR-Memo-4593

Thermal-hydraulic analysis of the Piqua core, by J. D. Wilde. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Nov 59. 25p. Order from LC. Mi $2.70, ph $4.80. NAA-SR-Memo-4626

Geometric buckling of a bare truncated sphere, by D. P. Gamble. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Nov 59. 9p. Order from LC. Mi $1.80, ph $1.80. NAA-SR-Memo-4665

Performance requirements and dynamic response of Piqua OMR reactor outlet temperature control subsystem. by R. L. Detterman. Atomics International. A Division of North American Aviation, Inc., Canoga Park, Calif. Nov 59. 65p. Order from LC. Mi $3.90, ph $10.80. NAA-SR-Memo-4671

Vibrational characteristics of an HNPF 19-rod 5.0 square inch fuel element mockup, by J. A. Hagel. Atomics International. North American Aviation, Inc., Canoga Park, Calif. Dec 59. 17p. Order from LC. Mi $2.40, ph $3.30. NAA-SR-Memo-4698

Steam cycles for advanced organic reactor plants, by G. R. Terpe. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Dec 59. 10p. Order from LC. Mi $2.40, ph $3.30. NAA-SR-Memo-4736 (Rev. A)

Preliminary evaluation of the mechanism of fuel element fouling, by P. Shroff and C. Goetz. Atomics International Division of North American Aviation, Inc., Canoga Park, Calif. Dec 59. 19p. Order from LC. Mi $2.40, ph $3.30. NAA-SR-Memo-4750

Piqua OMR high boiler disposal prototype: system description and operating experience, by R. R. Stiens. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Feb 60. 19p. Order from LC. Mi $2.40, ph $3.30. NAA-SR-Memo-4790

Thermal and hydraulic preliminary design method for the OMRE U-alloy (4th) core loading, by D. B. Sedgley. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Dec 59. 16p. Order from LC. Mi $2.40, ph $3.30. NAA-SR-Memo-4810 (Rev. A)

Evaluation of the use of delayed neutron and gaseous fission product monitoring for detection of fuel cladding failures in advanced OMR's, by C. C. Weeks. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Jan 60. 16p. Order from LC. Mi $2.40, ph $3.30. NAA-SR-Memo-4866

Some effects of fuel element geometry upon the nuclear, thermal and hydraulic performance of an OMRE core, by R. W. Hardy and others. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Jan 60. 19p. Order from LC. Mi $2.40, ph $3.30.
NAA-SR-Memo-4907

Radial temperature profile of sodium pool boiling heater assembly, by H. H. Cappel. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Feb 60. 8p. Order from LC. Mi $1.80, ph $1.80.
NAA-SR-Memo-4914

Study of fuel temperature and flow effects of plugging in SRE fuel, by R. C. Noyes. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Mar 60. 33p. Order from LC. Mi $3.00, ph $6.30.
NAA-SR-Memo-4952

A preliminary nuclear analysis of a sodium cooled fast reactor (SCFR) wity UC fuel elements in a skewed hexagonal array, by H. Jackel. Atomics International. Division of North American Aviation, Inc. Canoga Park, Calif. Feb 60. 18p. Order from LC. Mi $2.40, ph $3.30.
NAA-SR-Memo-5011

Bibliography of reports on fast reactor technology, by B. R. Hayward and M. Bloomfield. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Mar 60. 11p. Order from LC. Mi $2.40, ph $3.30.
NAA-SR-Memo-5054

Relationship of radiation units to radiation damage for SNAP-2 reactor systems, by F. D. Anderson. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Mar 60. 13p. Order from LC. Mi $2.40, ph $3.30.
NAA-SR-Memo-5059

Measurement of radiation about the graphite critical facility, by C. H. Skeen. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Mar 60. 11p. Order from LC. Mi $2.40, ph $3.30.
NAA-SR-Memo-5064

Power calibration of graphite critical assembly, by C. H. Skeen. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Mar 60. 5p. Order from LC. Mi $1.80, ph $1.80.
NAA-SR-Memo-5065

Reactor power calibration by the source insertion technique, by E. L. Zimmerman. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Mar 60. 9p. Order from LC. Mi $1.80, ph $1.80.
NAA-SR-Memo-5082

Control rod test furnace control system, by J. W. Crowe. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Mar 60. 19p. Order from LC. Mi $2.40, ph $3.30.
NAA-SR-Memo-5085

Hydraulic tests of the 5-rod and dummy SRE fuel elements, by R. J. Begley. Atomics International Division of North American Aviation, Inc., Canoga Park, Calif. Apr 60. 14p. Order from LC. Mi $2.40, ph $3.30.
NAA-SR-Memo-5124

Flux measurements in the Piqua OMR critical assembly, by R. J. Tuttle. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Apr 60. 18p. Order from LC. Mi $2.40, ph $3.30.
NAA-SR-Memo-5145

Analog computer study of the 255 Mw ASGR core kinetics, by H. H. Cappel. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Mar 60. 38p. Order from LC. Mi $3.00, ph $6.30.
NAA-SR-Memo-5146

Analysis of OMRE waste gas, by H. M. Gilroy. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. May 60. 34p. Order from LC. Mi $2.70, ph $4.80.
NAA-SR-Memo-5158

SNAP-II reactor core materials, by J. V. Facha. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Apr 60. Contract AT-11-1-GEN-8. 12p. Order from LC. Mi $2.40, ph $3.30.
NAA-SR-Memo-5166

A simplified two group method for calculating reactor lifetime behavior, by R. Sevy. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. June 60. 12p. Order from LC. Mi $2.40, ph $3.30.
NAA-SR-Memo-5168 (Rev. A)

Test results on the power/flow comparator and flow/flow ratio computer for the HNPF plant protective system, by E. J. Westerweller. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Apr 60. 12p. Order from LC. Mi $2.40, ph $3.30.
NAA-SR-Memo-5218

Design tests, fuel channel exit temperature and rate change of temperature circuits, by D. E. Brown and E. J. Westerweller. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Apg 60. 11p. Order LC. Mi $2.40, ph $3.30.
NAA-SR-Memo-5222

5 MW_t sodium deuterium reactor experiment--design report, by S. Davis. Nuclear Development Corporation of America, White Plains, N. Y. June 59. Contract AT(30-1)-2303. 42p. Order from LC. Mi $3.30, ph $7.80. NDA-84-22

A study of wet steam as a reactor coolant. Quarterly technical progress report for the period January 1, 1960 through March 31, 1960. Nuclear Development Corporatinn, of America, White Plains, N. Y. Apr 60. Contract AT(30-1)-2303. 27p. Order from LC. Mi $2.70, ph $4.80.
NDA-2132-3

Further examination of seawolf (S2G) components. Nuclear Development Corporation, of America, White Plains, N. Y. Jan 60. Contract AT(11-1)-732. 40p. Order from LC. Mi $3.30, ph $7.80.
NDA-2114-2

Power reactor program. Progress report to E. I. du Pont de Nemours and Company for the period November 1, 1958 through November 30, 1958, by F. S. Gardner and others. Niclear Metals, Inc., Concord, Mass. Feb 59. Contract AT (30-1)-1565. 20p. Order from LC. Mi $2.70, ph $4.80. NMI-4383

Power reactor program. Progress report to E. I. du Pont de Nemours and Company for the period July 1, 1959 through July 31, 1959, by S. Isserow. Nuclear Metals, Inc., Concord, Mass. Oct 59. Contract AT(30-1)-1565. 23p. Order from LC. Mi $2.70, ph $4.80. NMI-4396

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NYO-2128

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NYO-2941

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NYO-2947

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ORNL-3014

Monthly technical report for period November 1959. Power Reactor Development Company, Detroit, Mich. 1959. Contract AT(11-1)-476. 28p. Order from LC. Mi $2.70, ph $4.80.
PRDC-TR-29

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PRDC-TR-30

Kinetic studies of heterogeneous water reactors. Annual summary report - 1959, by R. F. Kemp and others. Thompson Ramo Wooldridge Inc., Ramo-Wooldridge Division, Research Laboratory, San Francisco, Calif. Feb 60. Contract AT (04-3)-165. 208p. Order from OTS. $2.50.
RWD-RL-167

Hot-area concept for radiation test facilities, by J. L. Colp. Sandia Corporation, Albuquerque, N. Mex. Dec 60. 20p. Order from OTS. 75 cents. SCR-235

An approximate study of the performance of a reactor-heat exchange system, by B. Wilcox. Sandia Corporation, Albuquerque, N. Mex. Aug 59. 147p. Order from LC. Mi $7.20, ph $22.80. SCTM-276-59-12

An experimental study of the coolant flow distribution within the turret reactor core, by B. Wilcox. Sandia Corporation, Albuquerque, N. Mex. Dec 59. 37p. Order from LC. Mi $3.00, ph $6.30.
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Containment of fragments from a runaway reactor, by G. B. Huber and others. Stanford Research Institute, Menlo Prrk, Calif. April 60. Contract AT(04-3)-115. 98p. Order from OTS. $2.50. SRIA-25

Heavy water power reactor program. Monthly progress report for July 1960. Savannah River Operations Office, AEC. Aiken, S. C. 1960. 22p. Order from LC. Mi $2.70, ph $4.80.
SRO-35

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SRO-36

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Station radiation level survey. Section III. First performance. Core I, seed I. Duquesne Light Company, Shippingport, Pa. Feb 60. 11p. Order from LC. Mi $2.40, ph $3.30.
TID-5614

Main unit heat rate tests. Section I. Third performance. Core I, seed I, Duquesne Light Company, Shippingport, Pa. Aug 59. 20p. Order from LC. Mi $2.40, ph $3.30. TID-5615

Periodic radiation survey of reactor plant container and components after shutdown "C" survey. Section III, 5735.8 EEPH. Fifth performance.

Core I, seed I. Duquesne Light Company, Shippingport, Pa. Feb 60. 6p. Order from LC. Mi $1.80, ph $1.80. TID-5616

Capped valve and D/P cell vent test. Section II. First performance. Core I, seed I. Duquense Light Company, Shippingport, Pa. Feb 60. 6p. Order from LC. Mi $1.80, ph $1.80. TID-5617

Refueling seal to reactor vessel head. Section I. Core I, seed I. Duquesne Light Company, Shippingport, Pa. Feb 60. 4p. Order from LC. Mi $1.80, ph $1.80. TID-5618

Control air conditions at the reactor chamber. Section II. Duquense, Light Company, Shippingport, Pa. Feb 60. 14p. Order from LC. Mi $2.40, ph $3.30. TID-5619

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Reactor kinetics with the group diffusion model, by E. L. Wachspress. Knolls Atomic Power Laboratory, Schenectady, N. Y. Feb 60. 21p. Order from LC. Mi $2.70, ph $4.80. TID-5647

Examination of components for crud and corrosion. Section I. First performance. Core I, seed I. Duquesne Light Company, Shippingport, Pa. Jan 60. 16p. Order from LC. Mi $2.40, ph $3.30. TID-5649

Radioactive waste disposal system periodic radiation monitoring survey. Section II. Core I, seed I. Duquesne Light Company, Shippingport, Pa. Dec 59. 17p. Order from LC. Mi $2.40, ph $3.30. TID-5650

Main unit heat rate tests. Section I. Second performance. Core I, seed I. Duquesne Light Company, Shippingport, Pa. Jan 60. 23p. Order from LC. Mi $2.70, ph $4.80. TID-5651

Periodic radiation survey of reactor plant container and components after shutdown "B" survey. Section II. Fourth performance. Core I, seed I. Duquesne Light Company, Shippingport, Pa. Dec 59. 18p. Order from LC. Mi $2.40, ph $3.30. TID-5653

Radiation survey of reactor plant containers and components after shutdown "D" survey. Section III. First performance. Core I, seed I. Duquesne Light Company, Shippingport, Pa. Dec 59. 7p. Order from LC. Mi $1.80, ph $1.80. TID-5654

ECNG-FWCNG gas-cooled reactor project progress review meeting, December 15, 1959, by R. B. Finn, Jr. and L. F. Smith. American Electric Power Service Corporation, New York, N. Y. 1959. 21p. Order from LC. Mi $2.40, ph $3.30. TID-5663

Fuel handling crane and extraction tool. Section I. Core I, seed I. Duquesne Light Company, Shippingport, Pa. Jan 60. 5p. Order from LC. Mi $1.80, ph $1.80. TID-5664

Monthly operating report, December 1959. Duquesne Light Company, Shippingport, Pa. 1959. Contract AT(11-1)-292. 42p. Order from LC. Mi $3.30, ph $7.80. TID-5713

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Leveling of extraction tool crane rails. Third performance. Core I, Seed I. Duquesne Light Company, Shippingport, Pa. Feb 60. 7p. Order from LC. Mi $1.80, ph $1.80. TID-5715

Flow coastdown test. Section I. Second performance. Core I, seed I. Duquesne Light Company, Shippingport, Pa. Mar 60. 28p. Order from LC. Mi $2.70, ph $4.80. TID-5716

Charging pump cavitation test. Section I. First performance. Core I, seed I. Duquesne Light Company, Shippingport, Pa. Feb 60. 6p. Order from LC. Mi $1.80, ph $1.80. TID-5723

Pl-2 design summary--1000 KW(e) portable boiling water nuclear power plant. Combustion Engineering Inc., Nuclear Division, Windsor, Conn. 1960. 19p. Order from LC. Mi $2.40, ph $3.30. TID-5742

ECNG-FWCNG gas-cooled reactor project; minutes of progress review meeting, January 14, 1960, by R. B. Finn, Jr. American Electric Power Service Corporation, New York, N. Y. Feb 60. 16p. Order from LC. Mi $2.40, ph $3.30. TID-5743

Monthly operating report, March 1960. Duquesne Light Company, Shippingport, Pa. 1960. Contract AT(11-1)-292. 30p. Order from LC. Mi $3.00, ph $6.30. TID-5944

Charging and discharging of demineralizer resins. Section VI. First performance. Core I, seed I. Duquesne Light Company, Shippingport, Pa. Mar 60. 5p. Order from LC. Mi $1.80, ph $1.80. TID-5757

Control and dynamics performance of a sodium cooled reactor power system, by R. D. Hansen and J. H. Eaton. Microtech Research Company, Cambridge, Mass. Dec 59. Contract AT(11-1)-666. 185p. Order from LC. Mi $8.70, ph $30.30. TID-5788

Specifications for the phase II construction and installation of the organic moderated reactor experiment, national reactor station, Idaho. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. June 56. 220p. Order from LC. Mi $9.90, ph $34.80 TID-5763

Core I control rod drive mechanisms periodic tests. Section I. Eleventh performance. Duquesne Light Company, Shippingport, Pa. Mar 60. 14p. Order from LC. Mi $2.40, ph $3.30. TID-5852

Core instrumentation calibration. Section V. Sixth performance. Duquesne Light Company, Shippingport, Pa. Mar 60. 17p. Order from LC. Mi $2.40, ph $3.30. TID-5853

Periodic radiation survey of reactor plant container and components after shutdown. Section III. "D" survey, first performance. Core I, Seed I, Duquesne Light Company, Shippingport, Pa. Mar 60. 7p. Order from LC. Mi $1.80, ph $1.80. TID-5854

Radiation survey of reactor plant containers and components after shutdown "D" survey. Section III. Second perofrmance. Core I, seed I Duquesne Light Company, Shippingport, Pa. Mar 60. 8 p. Order from LC. Mi $1.80, ph $1.80. TID-5855

Periodic radiation survey of reactor plant container and components after shutdown "G" survey Section V. EEPH--4235.5. Core I, seed I, Duquesne Light Company, Shippingport, Pa. Mar 60. 13p. Order from LC. Mi $2.40, ph $3.30. TID-5856

Comparison of fedal monitor readings with radiochemical sample data. Section I. Third performance. Core I, seed I. Duquesne Light Company, Shippingport, Pa. Mar 60. 19p. Order from LC. Mi $2.40, ph $3.30. TID-5857

Periodic radiation survey. Section II. 5187.7 EFPH. Third performance. Core I, Seed I. Duquesne Light Company, Shippingport, Pa. Apr 60. 16p. Order from LC. Mi $2.40, ph $3.30. TID-5858

Calibration of core thermocouples for 0-300 F service. Section I. Core I, Seed I. Duquesne Light Company, Shippingport, Pa. Mar 60. 11p. Order from LC. Mi $2.40, ph $3.30. TID-5859

Nuclear instrumentation--determining source of spikes in nuclear instruments. Section I. Duquesne Light Company, Shippingport, Pa. Apr 60. 4p. Order from LC. Mi $1.80, ph $1.80. TID-5860

Loss of load tests, core I, seed 1. Duquesne Light Company, Shippingport, Pa. May 60. 37p. Order from LC. Mi $3.00, ph $6.30. TID-5941

Reactor plant container integrity test, core I, seed 2. Duquesne Light Company, Shippingport, Pa. May 60. 6p. Order from LC. Mi $1.80, ph $1.80. TID-5942

Periodic radiation survey of reactor plant container and components after shutdown "G" survey. 5532.3 EEPH. Core I, seed 1. Duquesne Light Company, Shippingport, Pa. May 60. 15p. Order from LC. Mi $2.40, ph $3.30. TID-5960

Determination of blow-off tank vent throttle valve operating characteristics. Section I. Dquesne Light Company, Shippingport, Pa. Oct 59. 5p. Order from LC. Mi $1.80, ph $1.80. TID-5961

Periodic radiation survey of reactor plant container and components after shutdown "E" survey. Core I, seed 1. Test results DLCS-1840303 (T-612076). Duquesne Light Company, Shippingport, Pa. May 60. 10p. Order from LC. Mi $1.80, ph $1.80. TID-5962

Examination of components for crud and corrosion (pressurizer heaters and heater wells) core I, Seed 1. Duquesne Light Company, Shippingport, Pa. May 60. 6p. Order from LC. Mi $1.80, ph $1.80. TID-5963

Core I control rod drive mechanisms periodic tests, addendum I. Core I, seed 1. Duquesne Light Company, Shippingport, Pa. May 60. 10p. Order from LC. Mi $1.80, ph $1.80. TID-5964

Reactivity lifetime 3813.0 to 4948.0 EEPH, core I, seed 1. Duquesne Light Company, Shippingport, Pa. Apr 60. 205p. Order from LC. Mi $9.30, ph $31.80. TID-5965

Survey of the radiation levels in the containment vessel of the Enrico Fermi atomic power plant. Part V. Gamma radiation levels on the operating floor of the containment building. a. Levels above the equipment compartment. Technical memorandum no. 16, by W. F. Chaltron and H. E. Hungerford. Atomic Power Development Associates, Inc., Detroit, Mich. Dec 59. Contract AT(11-1)-476. 47p. Order from LC. Mi $3.30, ph $7.80. TID-6032

Detailed conceptual design of the graphite primary shield for the Enrico Fermi fast breeder reactor. Technical memorandum no. 23, by R. J. Beaudry and others. Atomic Power Development Associates, Inc., Detroit, Mich. Dec 59. Contract AT(11-1)-476. 98p. Order from LC. Mi $5.40, ph $15.30. TID-6033

Heavy water power reactor program monthly progress report for May 1960. Savannah River Operations Operations Office, AEC. Aiken, S. C. 1960. 15p. Order from LC. Mi $2.40, ph $3.30. TID-6077

Monthly operating report for October 1958, by G. Rifendifer. Duquesne Light Company, Shippingport, PA. Contract AT(11-1)-292. 37p. Order from LC. Mi $3.00, ph $6.30. TID-6092

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Monthly operating report for June 1959. Duquesne Light Company, Shippingport, Pa. Contract AT (11-1)-292. 39p. Order from LC. Mi $3.00, ph $6.30. TID-6098

Monthly operating report for October 1959. Duquesne Light Company, Shippingport, Pa. 1959. Contract AT(11-1)-292. 33p. Order from LC. Mi $3.00, ph $6.30. TID-6099

A method for measuring the specific activity of radioactive coolant in a pipe, by E. Czapek and others. General Dynamics Corporation, Electric Boat Division, Groton, Conn. Feb 60. 27p. Order from LC. Mi $2.70, ph $4.80. TID-6116

Reflector albedos and their use in simple reactivity-lifetime calculations, by A. J. Goodjohn and others and others. General Atomic Division, General Dynamics Corporation, San Diego, Calif. Feb 60. Contract AT(04-3)-197. 31p. Order from LC. Mi $2.70, ph $4.80. TID-6303

Periodic radiation survey of reactor plant container and components after shutdown. Core I. seed 2, Section 3. Duquesne Light Company, Shippingport, Pa. May 60. Order from LC. Mi $1.80, ph $1.80. TID-6314

Steam generator level control equipment, by W. H. Bergman. Knolls Atomic Power Laboratory, Schenectady, N. Y. June 58. 49p. Order from LC. Mi $3.30, ph $7.80. TID-6319

Basic heat transfer formulas and correlations used for the HTGR heat transfer calculations, by M. Troost. General Atomic Division, General Dynamics Corporation, San Diego, Calif. June 60. Contract AT(04-3)-314. 6p. Order from LC. Mi $1.80, ph $1.80. TID-6320

Monthly operating report for May 1960. Duquesne Light Company, Shippingport, Pa. 1960. Contract AT(11-1)-292. 30p. Order from LC. Mi $2.70, ph $4.80. TID-6377

Nuclear superheat meeting no. 1, September 21 to 23, 1959, by R. Pennington and others. Chicago Operations Office, AEC. San Jose, Calif. Nov 59. 42p. Order from OTS. $1.25. TID-7595

Nuclear superheat meeting no. 2, April 7 and 8, 1960, by C. B. Grahm and others. Chicago Operations Office, AEC. Dunedin, Fla. June 60. 48p. Order from OTS. $1.25 TID-7596

Fast breeder reactor program, by Staff of Division of Reactor Developmnet, USAEC Argonne National Laboratory, Argonne, Ill. and Atomic Power Development Associates. Jan 60. 12p. Order from OTS. 50 cents. TID-8523

Heavy water-zirconium-thorium type power conversion reactor, by J. B. Anderson and others. Argonne National Laboratory, Lemont, Ill. Feb 51. Decl. October 7, 1959. Contract W-31-109-eng-38. 57p. Order from LC. Mi $3.60, ph $9.30. TID-10095

The nuclear ramjet propulsion system, by T. C. Merkle. University of California. Lawrence Radiation Laboratory, Livermore, Calif. June 59. Contract W-7405-eng-48. 13p. Order from LC. Mi $2.40, ph $3.30. UCRL-5625

Tory II- A instrumentation system. Brief description, by C. S. Barnett and others. University of California, Lawrence Radiation Laboratory, Livermore, Calif. Mar 60. Contract W-7405-eng-48. 24p. Order from LC. Mi $2.70, ph $4.80. UCRL-5906

Research program at the Livermore pool-type reactor, by A. J. Kirschbaum and W. John. University of California. Lawrence Radiation Laboratory, Livermore, Calif. Nov 60. Contract W-7405-eng-48. 16p. Order from OTS. 50 cents. UCRL-6117 (Rev.)

Economic potential of the seed-blanket reactor, by F. Schwoerer. Westinghouse Electric Corporation, Bettis Atomic Power Laboratory, Pittsburgh, Pa. Dec 60. Contract AT-11-1-GEN-14. 92p. Order from OTS. $2.00. WAPD-237

Bettis technical review. Reactor technology, by W. Yeniscavich and others. Westinghouse Electric Corporation, Bettis Atomic Power Laboratory, Pittsburgh, Pa. Sep 60. Contract AT-11-1-GEN-14. 128p. Order from OTS. $2.50. WAPD-BT-20

Pressurized water reactor (PWR) project. Technical progress report for the period June 24, 1960 to August 23, 1960, by P. N. Ross. Westinghouse Electric Corporation, Bettis Atomic Power Laboratory, Pittsburgh, Pa. 1960. Contract AT-11-1-GEN-14. 115p. Order from OTS. $2.50. WAPD-MRP-87

Pressurized water reactor (PWR) project. Technical progress report for the period August 24 to October 23, 1960, by P. N. Ross. Westinghouse Electric Company, Bettis Atomic Power Laboratory, Pittsburgh, Pa. 1960. Contract AT-11-1-GEN-14. 97p. Order from OTS. $2.25. WAPD-MRP-88

Pressurized water reactor (PWR) project. Technical progress report for the period October 24 to December 23, 1960, by P. N. Ross. Westinghouse Electric Corporation, Bettis Atomic Power Laboratory, Pittsburgh, Pa. 1960. Contract AT-11-1-GEN-14. 122p. Order from OTS. $2.50. WAPD-MRP-89

Fast absorption of hafnium and cadmium-silver control rods, by R. J. Neuhold. Westinghouse Electric Corporation, Bettis Plant, Pittsburgh, Pa. Oct 58. Contract AT-11-1-GEN-14. 13p. Order from LC. Mi $2.40, ph $3.30. WAPD-T-753

Multi-region reactor lattice studies of fuel cycle development program for the period July 1 to December 31, 1960, by I. H. Coen. Westinghouse Electric Corporation, Atomic Power Department, Pittsburgh, Pa. Apr 60. Contract AT(30-1)-2176. 47p. Order from LC. Mi $3.30, ph $7.80. WCAP-1413

Multi-region recctor lattice studies. Quarterly progress report for July 1 to September 30, 1960, by I. H. Coen. Westinghouse Electric Corporation, Atomic Power Department, Pittsburgh, Pa. Oct 60. Contract AT(30-1)-2176. 48p. Order from OTS. $1.00. WCAP-1423

Nuclear and thermal calculations for WCAP-4 in-pile loop experiment, by A. Bournia and others. Westinghouse Electric Corporation, Atomic Power Department, Pittsburgh, Pa. [1960?]. Contract AT(30-3)-222. 41p. Order from LC. Mi $3.00, ph $6.30. WCAP-3270

Carolinas Virginia nuclear power associates, Inc. CYTR project. Monthly progress report for January 1960. Westinghouse Electric Corporation, Atomic Power Department, Pittsburgh, Pa. 1960. 27p. Order from LC. Mi $2.70, ph $4.80. WCAP-4009

Numerical integration of criticality equations and use of perturbation theory for bare Be-U^{235} reactors, by S. Preiser. Nuclear Development Associates, Inc., White Plains, N. Y. Jan 51. Decl. January 28, 1960. Contracts W-7405-eng-26 and AT(40-1)-1065. 20p. Order from LC. Mi $2.40, ph $3.30. Y-715

Yankee critical experiments: hazards summary report, by D. F. Hanlen and others. Westinghouse Electric Corporation, Atomic Power Department, Pittsburgh, Pa. May 58. Contract AT(30-3)-222. 44p. Order from LC. Mi $3.30, ph $7.80. YAEC-31 (Suppl.)

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CAT--an IBM 704 program for coolant actuated transients in an open-lattice core, by L. S. Tong, and others. Westinghouse Electric Corporation, Atomic Power Department, Pittsburgh, Pa. Feb 60. Contract AT(30-3)-222. 80p. Order from LC. Mi $4.50, ph $12.30. YAEC-145

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Technology—Feed Materials

Refining of MgX and other uranium-bearing materials. Quarterly progress report, by R. A. Ewing and others. Battelle Memorial Institute, Columbus, Ohio. Jane 51. Decl. March 7,1960. Contract AT-30-1-GEN-228. 51p. Order from LC. Mi $3.60, ph $9.30. BMI-254

A semi-empirical method for attaining predetermined uranium saturation levels in the Slurrex process, by R. W. West. National Lead Company of Ohio, Technical Division, Cincinnati, Ohio. April 53. Decl. May 3, 1960. Contract AT(30-1)-1156. 18p. Order from OTS. 30 cents. FMPC-216

Laboratory and pilot plant evaluation of Portuguese uranium concentrate and black oxide blends, by B. G. Ryle. and others. National Lead Company of Ohio, Cincinnati, Ohio. Mar 54. Decl. July 13, 1960. Contract AT(30-1)-1156. 19p. Order from OTS. 30 cents. FMPC-391

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Low temperature conversion of uranium dioxide to uranium tetrafluoride using aqueous hydrogen fluoride, by J. S. Fox and S. D. Schiffman. Carbide and Carbon Chemical Company, Union Carbide an d Carbon Corporation, K-25 Plant, Oak Ridge, Tenn. Oct 52. Decl. July 12, 60. Contract W-7405-Eng-26. 14 p. Order from OTS. 25 cents. K-965

Hydration of uranium trioxide for improving feed materials processing, by J. S. Fox. Carbide and Carbon Chemicals Comoany, Union Carbide and Carbon Corporation, K-25 Plant, Oak Ridge, Tenn. Aug 53. Decl. July 12, 1960. Contract W-7405-Eng-26. 16p. Order from OTS. 30 cents. K-1043

Thermodynamic properties of gaseous uranium hexafluoride, by B. H. Parks and D. W. Burton. Union Carbide Nuclear Company, Division of Union Carbide Corporation, Oak Ridge Gaseous Diffusion Plant, Oak Ridge, Tenn. Sep 60. Contract W-7405-eng-26. 43p. Order from OTS. $1.00. K-1458

Uranium refinery proposal, by A. L. Baker. The Vitro Corporation of America, New York, N. Y. May 49. Decl. August 24, 1960. 39p. Order from OTS. 40 cents. KLX-013

Additional studies on recovery of uranium hexafluoride from vent gases, by W. R. Golliher and others. Union Carbide Nuclear Company, A Division of Union Carbide Corporation, Paducah Plant, Paducah, Ky. Oct 57. Decl. May 17, 1960. Contract W-7405-eng-26. 16p. Order from OTS. 45 cents. KY-230

Specific surface and bulk density of U_3O_8 and UO_2 as factors in UF_4 production on the 250 gram uranium scale, by R. J. Bard and others. University of California, Los Alamos Scientific Laboratory, Los Alamos, N. Mex. Dec 54. Decl. June 18, 1960. Contract W-7405-Eng-36. 26p. Order from OTS. 35 cents. LA-1854

Progress report of pilot plant work on UF_4 production by continuous methods. Period covered August 15, 1948 to October 21, 1948, by E. K. Teter. Mallinckrodt Chemical Works, St. Louis, Mo. Oct 48. Decl. October 7, 1959. 12p. Order from LC. Mi $1.80, ph $1.80. MCW-152

Process development quarterly report, Part I, by J. Livasy and others. Mallinckrodt Chemical Works, St. Louis, Mo. Jan 55. Decl. July 12, 1960. Contract W-14-108-Eng-8. 75p. Order from OTS. 55 cents. MCW-1371

Process development quarterly report. Part II, by W. M. Leaders. Mallinckrodt Chemical Works, St. Louis, Mo. Feb 55. Decl. March 31, 1960. Contract W-14-108-Eng-8. 170p. Order from LC. Mi $7.80, ph $25.80. MCW-1372

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Evaluation of Australian rum jungle uranium concentrate for use as NLO refinery feed, by T. J. Collopy and others. National Lead Company of Ohio, Feed Materials Production Center, Cincinnati, Ohio. Jan 56. Decl. June 1, 1960. Contract AT(30-1)-1156. 20p. Order from OTS. 30 cents. NLCO-613

The recovery of uranium from composite U_4 reduction bomb scrap by a two-stage phosphate precipitation process, by E. R. Johnson and others. National Lead Company of Ohio, Technical Division, Cincinnati, Ohio. Mar 56. Decl. May 27, 1960. Contract AT(30-1)-1156. 28p. Order from OTS. 35 cents. NLCO-627

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Stripping agents for re-extraction of uranium in a uranyl nitrate hexahydrate-tributyl phosphate nitric acid system, by P. S. Gentile and T. J. Collopy. National Lead Company of Ohio, Cincinnati, Ohio. Dec 56. Decl. March 31, 1960. Contract AT(30-1)-1156. 48p. Order from LC. Mi $3.00, ph $6.30. NLCO-666

Acetate process for the production of thorium fluoride, by P. S. Gentile and M. D. Snyder. National Lead Company of Ohio, Feed Materials Production Center, Cincinnati, Ohio. Feb 57. Decl. July 19, 1960. Contract AT(30-1)-1156. 19p. Order from OTS. 30 cents. NLCO-683

Refining of thorium-containing uranium concentrates by extraction with tributyl phosphate, by C. W. Huntington. National Lead Company, of Ohio, Cincinnati, Ohio. Aug 57. Decl. April 28, 1960. Contract AT(30-1)-1156. 31p. Order from LC. Mi $2.70, ph $4.80. NLCO-692

Studies of the behavior of the TBP-kerosene solvent in uranium refining: recovery of discarded refinery solvent, by R. H. Ellerhorst. National Lead Company of Ohio, Cincinnati, Ohio. Jan 58. Dec. April 28, 1960. Contract AT(30-1)-1156. 25p. Order from LC. Mi $2.70, ph $4.80. NLCO-714

Laboratory evaluation of Ramapo uranium gravity concentrate, by J. H. Krekeler and others. National Lead Company of Ohio, Cincinnati, Ohio. Apr 58. Decl. March 28, 1960. Contract AT(30-1)-1156. 11p. Order from LC. Mi $2.40, ph $3.30. NLCO-741

Studies of the TBP-kerosene solvent in uranium refining: Quality evaluation and treatment techniques for used solvent, by R. K. Klopfenstein and others. National Lead Company of Ohio, Feed Materials Production Center, Cincinnati, Ohio. July 60. Contract AT(30-1)-1156. 35p. Order from OTS. 75 cents. NLCO-815

Summary technical report for the period July 1, 1960 to September 30, 1960, by F. L. Cuthbert. National Lead Company of Ohio, Cincinnati, Ohio. Oct 60. Contract AT(30-1)-1156. 88p. Order from OTS. $2.00. NLCO-820

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Anion replacement reactions for the removal of strontium from aqueous solutions, by L. L. Ames, Jr. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. July 60. Contract AT(45-1)-1350. 30p. Order from OTS. 75 cents. HW-66383

Quarterly progress report research and development activities fixation of radioactive residues, for April to June, 1960, by D. W. Pearce. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. July 60. Contract AT(45-1)-1350. 30p. Order from OTS. 75 cents. HW-66571

Review of soil chemistry research at Hanford, by D. W. Bensen. General Electric Company, Hanford Atomic Products Operation, Richland, Wash. Aug 60. Contract AT(45-1)-1350. 38p. Order from OTS. $1.00. HW-67201

Chemistry of the intercycle evaporator incident of November 20, 1959, by W. Davis and others. Oak Ridge National Laboratory, Oak Ridge, Tenn. Nov 60. Contract W-7405-eng-26. 17p. Order from OTS. 50 cents. ORNL-2979

SOURCE INDEX

Source	Page	PB Number
Aarhus U., Denmark	449	153 305
Adjutant General's Office, Washington, D.C.	393	153 440
Advanced Kinetics, Inc., Santa Ana, Calif.	472	153 426
Aero Geo Astro Corp., Alexandria, Va.	420	153 712
Aeroelastic and Structures Research Lab., Mass. Inst. of Tech., Cambridge	454	171 415
Aerojet-General Corp., Azusa, Calif.	442	153 441
Aeronautical Research Associates of Princeton, Inc., N.J.	457	153 459
Aeronautical Research Labs., Air Force Research Div., Wright-Patterson AFB, Ohio	435	152 320
		152 321
	449	153 385
Aeronautical Turbine Lab., Naval Air Turbine Test Station, Trenton, N.J.	416	153 289
Aeronutronic, Newport Beach, Calif.	435	153 744
Aerospace Medical Div., Wright Air Development Div., Wright-Patterson AFB, Ohio	397	171 392
Air Crew Equipment Lab., Naval Air Material Center, Philadelphia, Pa.	406	153 354
Air Force Cambridge Research Labs., Bedford, Mass.	411	153 394
	462	153 395
	467	153 392
		153 393
Air Force Missile Development Center, Holloman AFB, N. Mex.	393	152 686
	435	153 408
	442	150 719
	474	153 465
Airborne Instruments Lab., Deer Park, N.Y.	416	171 370
Alaska U., College	411	153 371
	441	153 540
	478	153 520
		153 521
Allied Research Associates, Inc., Boston, Mass.	436	153 161
American Electronic Labs., Inc., Philadelphia, Pa.	420	153 227
American Inst. for Research, Pittsburgh, Pa.	392	153 165
	420	150 703
American Power Jet Co., Ridgefield, N.J.	392	153 547
Antenna Lab., Calif. Inst. of Tech., Pasadena	421	153 224
Applied Mathematics and Statistics Labs., Stanford U., Calif.	449	147 121
Applied Psychological Services, Wayne, Pa.	393	153 779
Arctic Aeromedical Lab., Ladd AFB, Alaska	393	153 329
		153 323
	394	153 321
		153 322
	397	153 369
		153 373
		153 545
	398	153 372
		153 544
	402	153 522
	403	153 507
		153 513
		153 515
		153 518
		153 543
	411	153 514
	412	153 324
	420	153 517
Arctic Aeromedical Lab., Ladd AFB, Alaska (con.)	440	153 519
		153 546
	441	153 512
		153 523
	464	153 508
		153 509
		153 516
	465	153 510
	478	153 367
Armed Forces-NRC Committee on Hearing and Bio-Acoustics, Washington, D.C.	398	153 778
Armour Research Foundation, Chicago, Ill.	460	153 168
	469	171 474
Army Chemical Corps, Fort Detrick, Md.	477	152 927
Army Chemical Research and Development Labs., Army Chemical Center, Md.	396	153 174
Army Engineer Research and Development Labs., Fort Belvoir, Va.	447	153 078
	450	153 077
Army Ordnance Human Engineering Lab., Aberdeen Proving Ground, Md.	392	153 470
	398	153 469
Army Signal Missile Support Agency, White Sands Missile Range, N. Mex.	436	153 182
Army Signal Research and Development Lab., Fort Monmouth, N.J.	411	150 705
	421	150 704
		152 998
		153 000
		153 001
		153 004
	444	150 706
	451	153 002
	475	171 377
Army Transportation Research and Engineering Command, Fort Eustis, Va.	419	150 075
Arnold Engineering Development Center, Tullahoma, Tenn.	454	153 477
ARO, Inc., Tullahoma, Tenn.	454	153 477
Avco Corp., Wilmington, Mass.	445	171 413
Avco Everett Research Lab., Mass.	454	149 676
Ballistic Research Labs., Aberdeen Proving Ground, Md.	422	150 066
		153 494
	436	150 068
		150 070
		150 724
		153 425
	440	154 406
	442	153 493
	454	150 067
		150 069
	466	153 073
Battelle Memorial Inst., Columbus, Ohio	391	154 409
	458	153 929
	469	171 406
Behavioral Sciences Lab., Wright Air Development Div., Wright-Patterson AFB, Ohio	435	171 419
Bell and Howell Research Center, Pasadena, Calif.	405	171 409
Bell Aircraft Corp., Buffalo, N.Y.	445	171 390
Bell Helicopter Corp., Fort Worth, Tex.	416	154 405
Biomedical Lab., Wright Air Development Div., Wright-Patterson AFB, Ohio	398	171 367
Boeing Airplane Co., Seattle, Wash.	422	171 416
Bolt, Beranek and Newman, Inc., Cambridge, Mass.	422	153 175
Bonn U., West Germany	406	150 690
British Columbia U., Canada	467	153 397
Brooke Army Medical Center, Fort Sam Houston, Tex.	403	153 192
		153 193
	404	153 194
Brown U. Div. of Applied Mathematics, Providence, R.I.	452	147 401
	458	153 162
	465	154 291
	473	153 074
	475	147 400
Brown U. Div. of Engineering, Providence, R.I.	453	147 362
Brush Beryllium Co., Cleveland, Ohio	460	171 389
Brussels U., Belgium	447	153 299
Bryn Mawr Coll., Pa.	394	153 424
Bureau of Naval Weapons, Washington, D.C.	405	171 236
	422	171 239
		171 241
		171 243
		171 245
	423	171 224
		171 225
		171 226
		171 227
		171 228
		171 231
		171 240
	424	171 229
		171 230
		171 232
		171 233
		171 234
		171 235
		171 242
		171 244
		171 246
	468	171 238
Bureau of Ships, Washington, D.C.	405	171 236
	422	171 239
		171 241
		171 243
		171 245
	423	171 224
		171 225
		171 226
		171 227
		171 228
		171 231
		171 240
	424	171 229
		171 230
		171 232
		171 233
		171 234
		171 235
		171 242
		171 246
	465	171 237
	468	171 238
California State Polytechnic Coll., San Luis Obispo	474	153 465
California U., Berkeley	399	153 409
	425	171 414
California U., Los Angeles	393	152 686
	411	153 204
	425	153 438
	466	153 099
Calvin Coll., Grand Rapids, Mich.	407	152 871
Carnegie Inst. of Tech., Graduate School of Industrial Administration, Pittsburgh, Pa.	444	150 713
	450	150 714
Case Inst. of Tech., Cleveland, Ohio	425	153 417
Center for International Studies, Mass. Inst. of Tech., Cambridge	394	153 287
Chicago U., Ill.	412	153 232

Source	Page	PB Number
Coating and Chemical Lab., Aberdeen Proving Ground, Md.	407	171 128
Colorado U., Boulder	407	171 376
Columbia U., New York	449	153 754
	453	153 734
Computer Engineering Associates, Inc., Pasedena, Calif.	454	171 407
Copenhagen U., Denmark	397	153 468
Cornell U., Ithaca, N.Y.	463	153 131
Cornell U. Graduate School of Aeronautical Engineering, Ithaca, N.Y.	455	153 092
Cornell U. Medical Coll., New York	412	153 324
Cornell U. School of Electrical Engineering, Ithaca, N.Y.	392	152 872
	414	150 071
Courtney and Co., Philadelphia, Pa.	417	150 920
Cryogenic Lab., Ohio State U. Research Foundation, Columbus	407	154 056
Danish Meteorological Inst., Carlottenlund	412	153 093
Dartmouth Coll., Hanover, N.H.	411	153 480
	413	153 481
David Sarnoff Research Center, Princeton, N.J.	425	171 386
David Taylor Model Basin, Washington, D.C.	440	152 689
		153 953
Daystrom Instrument, Archbald, Pa.	425	150 698
Defense Atomic Support Agency, Washington, D.C.	464	171 361
Defense Metals Information Center, Battelle Memorial Inst., Columbus, Ohio	437	151 101
	444	161 230
	446	161 233
	458	151 098
		161 229
	459	151 100
	461	151 103
	474	161 228
Detroit Testing Lab., Mich.	461	171 394
Diamond Ordnance Fuze Labs., Washington, D.C.	391	153 505
	425	153 579
	437	152 654
		152 917
		153 478
	469	171 187
Douglas Aircraft Co., Inc., Long Beach, Calif.	446	171 398
Dynamic Analysis and Control Lab., Mass. Inst. of Tech., Cambridge	443	152 525
Eagle-Picher Co., Joplin, Mo.	426	153 231
Ecole Nationale Superieure de Chimie de Strasbourg, France	466	153 281
Ecole Normale Superieure, France	463	150 693
Educational Testing Service, Princeton, N.J.	394	148 018
Electrical Engineering Research Lab., U. of Illinois, Urbana.	476	152 876
Electronic Systems Lab., Mass. Inst. of Tech., Cambridge	451	153 560
Electronics Research Lab., Northeastern U., Boston, Mass.	426	153 722
Electronics Research Lab., U. of California, Berkeley	426	153 400
	467	152 931
Engineering Div., Air Materiel Command, Wright-Patterson AFB, Ohio	417	154 292
Feltman Research Labs., Picatinny Arsenal, Dover, N.J.	437	150 097
	438	152 316
		153 111
		171 326
	453	153 386
Flight Accessories Lab., Wright Air Development Div., Wright-Patterson AFB, Ohio	438	171 363
	478	171 385
Forschungsinstitut für Physik der Strahlantriebe e.v., Stuttgart (West Germany)	473	150 688
Frankfurt U. (West Germany)	442	150 719
Franklin Inst. Labs. for Research and Development, Philadelphia, Pa.	442	153 128
Frick Chemical Lab., Princeton U., N.J.	408	148 021
		150 923
Gates and Crellin Labs. of Chemistry, Calif. Inst. of Tech., Pasadena	405	153 156
General Electric Co., Owensboro, Ky.	426	154 484-1
		154 484-2
General Electric Co., Schenectady, N.Y.	467	153 683
General Electric Research Lab., Schenectady, N.Y.	459	171 025
	461	171 393
	462	152 866
	475	150 718
General Electronic Labs., Inc., Cambridge, Mass.	426	153 241
General Telephone and Electronics Labs., Inc., Bayside, N.Y.	408	171 373
George Washington U., Washington, D.C.	442	153 145
Georgia U., Athens	414	150 721
Gustaf Werner Inst. for Nuclear Chemistry (Sweden)	404	153 304
Haloid Xerox, Inc., Rochester, N.Y.	427	171 380
Harpur Coll., State U. of New York, Endicott, N.Y.	479	153 121
Harvard Graduate School of Business Administration, Cambridge, Mass	394	153 287
Harvard U., Cambridge, Mass.	463	147 900
Haverford Coll., Pa.	427	153 101
Hebrew U., Israel	449	153 306
		153 308
Henry Ford Hospital, Detroit, Mich.	400	153 164
Hiller Aircraft Corp., Palo Alto, Calif.	417	153 083
Hughes Research Labs., Malibu, Calif.	427	153 396
Human Factors Research, Inc., Los Angeles, Calif.	395	153 126
		153 141
Human Sciences Research, Inc., Arlington, Va.	477	153 129
Illinois Inst. of Tech., Chicago	469	153 552
Illinois State Water Survey, Urbana	412	153 239
Illinois U., Urbana	395	153 168
	453	153 119
Illinois U., Urbana (con.)	453	171 374
	462	153 151
	470	152 604
Indiana U. School of Medicine, Indianapolis	400	153 303
Institut Pasteur, Paris (France)	408	152 685
Institute for Applied Experimental Psychology, Tufts U., Medford, Mass.	395	147 533
	477	152 914
Institute for Cooperative Research, U. of Pennsylvania, Philadelphia	479	153 770
Institute for Fluid Dynamics and Applied Mathematics, U. of Maryland, College Park	408	149 731
Institute for Quantitative Research in Economics and Management, Purdue U., Lafayette, Ind.	479	153 148
Institute for System Research, U. of Chicago, Ill.	455	171 387
		171 388
Institute for the Study of Metals, U. of Chicago, Ill.	408	153 765
Institute of Anatomy, U. of Uppsala (Sweden)	404	153 304
Institute of Engineering Research, U. of California, Berkeley	470	171 360
	474	154 293
Institute of Flight Structures, Columbia U., New York	476	148 525
Institute of Mathematical Sciences, New York U., N.Y.	427	152 727
	476	152 781
Institute of Tech., U. of Minnesota, Minneapolis	470	147 120
Institute of Transportation and Traffic Engineering, U. of California, Berkeley	417	171 369
Intermountain Weather, Inc., Salt Lake City, Utah	412	153 634
International Business Machines Corp., Yorktown Heights, N.Y.	451	150 086-1
		150 086-3
	452	150 086-4
Ionosphere Research Lab., Pennsylvania State U., University Park	415	153 197
Isotopes, Inc., Westwood, N.J.	464	171 362
Istituto di Fisica, Universita di Padova (Italy)	409	152 608
Istituto Electrotecnico Nazionale "Galileo Ferraris" (Italy)	466	150 695
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena	427	153 950
		153 951
	438	153 952
	447	154 410
		154 411
	448	153 948
		153 949
Kentucky U., Lexington	409	153 451
Laboratory for Insulation Research, Mass. Inst. of Tech., Cambridge	428	150 709
	465	150 922
	470	147 173
		147 174
		147 759
Lincoln Lab., Mass. Inst. of Tech., Lexington	391	152 827
	415	153 486
	428	152 974
		153 217
		153 225
		153 421
		153 697
	429	153 696

PB Number	Source	Page	PB Number
171 374	Lincoln Lab., Mass. Inst. of Tech., Lexington (con.)	438	153 220
153 151		439	153 218
152 604			153 219
		452	153 361
153 303		455	152 620
		471	153 284
152 685			
	Little, Arthur D., Inc., Cambridge, Mass.	446	171 405
147 533			
152 914	Litton Industries, Salt Lake City, Utah	429	153 245
	Lockheed Aircraft Corp., Sunnyvale, Calif.	412	153 437
153 770		417	153 435
			171 372
		429	152 693
			152 719
149 731			153 645
		439	153 655
		444	171 379
		453	153 357
		455	152 844
153 148			
	MacDonald Physics Lab., McGill U. (Canada)	415	153 061
171 387			
171 388	McGill U. (Canada)	413	150 723
	Mallinckrodt Chemical Lab., Harvard U., Cambridge, Mass.	467	153 153
153 765			
	Mallory, P. R., and Co., Inc., Indianapolis, Ind.	429	150 689
153 304			
	Manufacturing Labs., Inc., Cambridge, Mass.	446	171 400
171 360			
154 293			
	Maryland U., College Park	392	150 722
		467	153 291
148 525			
	Massachusetts Inst. of Tech., Cambridge	447	171 391
		456	153 420
152 727		460	171 399
152 781		468	152 874
		471	152 982
147 120			
	Massachusetts U., Amherst	405	150 656
	Materials Research Lab., U. of California, Berkeley	471	146 924
171 369			171 371
	Materials Research Lab., Watertown Arsenal, Mass.	463	150 708
153 634			
	Melpar, Inc. Falls Church, Va.	452	153 455
150 086-7			
150 086-8			
150 086-9			
	Metals and Ceramics Lab., Wright Air Development Div., Wright-Patterson AFB, Ohio	459	171 411
		461	171 394
153 197			171 510
171 362			
	Metals Research Lab., Brown U., Providence, R. I.	446	153 439
152 608			
	Michael Reese Hospital, Chicago, Ill.	399	153 365
150 698			
	Michelson Labs., Naval Ordnance Test Station, China Lake, Calif.	443	153 286
153 950			
153 951			
153 952			
	Michigan State U., East Lansing	397	153 524
154 410			
154 411			
153 948			
153 949			
	Michigan U., Ann Arbor	456	150 982
153 451		459	171 366
	Michigan U. Coll. of Engineering, Ann Arbor	453	153 171
		468	152 836
		476	152 835
150 709			
150 922			
147 173			
147 174			
147 759			
	Michigan U. Coll. of Literature, Science, and the Arts, Ann Arbor	309	152 611
	Michigan U. Research Inst., Ann Arbor	418	171 404
152 827			
153 484			
152 974			
153 217			
153 225			
153 421			
153 697			
153 646			
	Microwave Associates, Inc., Burlington, Mass.	429	153 229
	Microwave Lab., Stanford U., Calif.	430	153 504
		458	153 650
		473	153 098
	Microwave Research Inst., Polytechnic Inst. of Brooklyn, N.Y.	430	153 454
	Mine Safety Appliances Co., Callery, Pa.	405	154 408
	Minnesota U., Minneapolis	450	153 433
	Minnesota U. School of Physics, Minneapolis	392	148 496
	Mississippi Southern Coll., Hattiesburg	396	171 403
	Moore School of Electrical Engineering, U. of Pennsylvania, Philadelphia	431	153 954
	Motorola, Inc., Chicago, Ill.	430	150 692
	National Aeronautics and Space Administration, Washington, D.C.	472	153 564
	National Aviation Facilities Experimental Center, Atlantic City, N.J.	430	171 368
	National Bureau of Standards, Boulder, Colo.	415	161 583
		430	150 064
	National Bureau of Standards, Washington, D.C.	408	150 923
		465	161 560
		479	161 586
	National Carbon Co., Inc., Parma, Ohio	447	171 365
	National Library of Medicine, Washington, D.C.	404	150 062
	National Research Labs., Ottawa, Canada	441	153 632
		477	153 633
	Naval Civil Engineering Lab., Port Hueneme, Calif.	418	153 178
		420	171 375
	Naval Ordnance Lab., Corona, Calif.	430	150 707
	Naval Ordnance Test Station, China Lake, Calif.	418	153 404
		430	153 084
		431	153 221
		439	153 086
		443	152 790
			153 181
			153 290
		456	154 403
		462	153 407
	Naval Research Lab., Washington, D.C.	409	151 990
		431	143 302
			150 319
		441	149 520
		455	149 296
		480	171 316
	Naval Supersonic Lab., Mass. Inst. of Tech., Cambridge	456	153 104
			153 106
		474	153 105
	Naval Supply Research and Development Facility, Bayonne, N.J.	441	153 198
	Naval Weapons Lab., Dahlgren, Va.	479	152 978
	New Hampshire U., Durham	406	153 215
			153 216
	New York U., N.Y.	460	171 412
		471	150 323
	New York U. Coll. of Engineering, N.Y.	413	150 060
		458	153 159
	Nobel Inst. of Physics, Stockholm, Sweden	431	150 720
	Non-Metallic Materials Lab., Wright Air Development Div., Wright-Patterson AFB, Ohio	474	171 395
	North Carolina State Coll., Raleigh	439	150 702
	North Carolina U., Chapel Hill	450	150 711
		472	153 564
	North Dakota U., Grand Forks	399	153 542
	Noyes Chemical Lab., U. of Illinois, Urbana	409	147 776
			150 921
	Nuclear Metals, Inc., Concord, Mass.	447	171 391
	Observatoire de Haute-Paris (France)	478	152 588
	Office of Ordnance Research, Durham, N.C.	477	152 927
	Office of Scientific Research and Development, Div. 19	431	153 954
	Office of Technical Services, Dept. of Commerce, Washington, D.C.	391	OTS SB-437
			OTS SB-438
		448	OTS SB-440
		460	OTS SB-445
		472	OTS SB-435
	Ohio State U. Research Foundation, Columbus	415	150 697
			153 283
		418	171 408
		467	153 392
		468	153 657
		478	152 588
			153 430
	Oregon State Coll., Corvallis	472	153 143
	Page Communications Engineers, Inc., Washington, D.C.	432	153 609
	Parke Mathematical Labs., Inc., Carlisle, Mass.	450	153 458
		473	153 728
	Pennsylvania State U., University Park	410	153 157
		448	153 173
	Pennsylvania State U. Coll. of Mineral Industries, University Park	410	154 295
		472	154 297
	Pennsylvania State U. Mineral Industries Experiment Station, University Park	411	153 422
	Pennsylvania U., Philadelphia	475	153 166
	Pennsylvania U. School of Medicine, Philadelphia	416	153 334
	Personnel Lab., Wright Air Development Div., Lackland AFB, Tex.	393	153 852
			153 853
	Physical Research Lab., Space Tech. Labs., Inc., Los Angeles, Calif.	439	152 829
		443	152 830
		473	154 404
	Physical Sciences Lab., Ordnance Tank-Automotive Command, Center Line, Mich.	461	171 381
	Physics Lab., Wright Air Development Div., Wright-Patterson AFB, Ohio	406	171 401
		463	171 402
	Pittsburgh U., Pa.	400	153 127
	Plesset, E. H., Associates, Inc., Los Angeles, Calif.	432	153 498
	Polytechnic Inst. of Brooklyn, N.Y.	439	153 388
		456	153 184
		457	152 838
		472	153 147
	Poulter Labs., Stanford Research Inst., Menlo Park, Calif.	440	153 316
	Princeton U., N.J.	410	149 648
		418	152 873
		419	150 075
		444	147 534
	Psychological Lab., U. of Southern California, Los Angeles	396	148 006
			148 007

Source	Page	PB Number
Public Health Service, Washington, D.C.	404	161 371-10
Purdue U., Lafayette, Ind.	406	153 265
Purdue U. Div. of Engineering Sciences, Lafayette, Ind.	453	152 904
Quartermaster Research and Engineering Center, Natick, Mass.	465	152 688
Radiobiological Lab., U. of Texas, Austin	404	153 301
Raytheon Co., Waltham, Mass.	432	150 699 153 240
Reflectone Electronics, Inc., Stamford, Conn.	436	171 419
Rensselaer Polytechnic Inst., Troy, N.Y.	410 457 484	147 045 153 261 153 315 153 501
Research Labs. for the Engineering Sciences, U. of Virginia, Charlottesville	410	153 356
RIAS, Baltimore, Md.	450	153 412 153 414 153 711
Rochester U., N.Y.	396 399	152 881 147 778
Rocketdyne, Canoga Park, Calif.	419	152 319
Rome Air Development Center, Griffiss AFB, N.Y.	432	153 205 171 420
Royal Military Coll. of Canada	475	153 166
Sarah Mellon Scaife Radiation Lab., U. of Pittsburgh, Pa.	468	150 700
School of Aviation Medicine, Brooks AFB, Tex.	399	147 778 153 302
Science Research Associates, Inc., Chicago, Ill.	394	148 771
Sferi-Coanda, Clichy (France)	457	153 378
Skiatron Electronics and Television Corp., New York	452	152 928
Southern Research Inst., Birmingham, Ala.	448	171 417
Space Sciences Lab., General Electric Co., Philadelphia, Pa.	440	153 492
Speech Research Lab., U. of Michigan, Ann Arbor	466	153 170
Sperry Gyroscope Co., Great Neck, N.Y.	419	154 298
Springfield Armory, Mass.	445	153 223
Stanford Electronics Labs., Stanford U., Calif.	432 433 	153 169 147 243 147 244 150 715 150 716
Stanford Research Inst., Menlo Park, Calif.	411 452	153 314 153 206
Stanford U., Calif.	475	154 294
Stoddart Aircraft Radio Co., Inc., Hollywood, Calif.	433	150 712
Syracuse U., N.Y.	450	153 358 153 359 153 360
Syracuse U. Research Inst., N.Y.	459	171 396
Technical Operations, Inc., Arlington, Mass.	462	154 407
Technische Hochschule, Stuttgart, West Germany	474	153 466
Texas A. and M. Coll., College Station	413	150 691
Thermophysical Properties Research Center, Purdue U., Lafayette, Ind.	479	171 478
Thompson, John I., and Co., Washington, D.C.	441	171 418
Thompson Ramo Wooldridge, Inc., Inglewood, Calif.	434	153 235
TRG, Inc., Syosett, N.Y.	464	171 397
Tufts U. School of Medicine, Boston, Mass.	400 401 402 	153 526 153 527 153 528 153 529 153 530 153 531 153 532 153 533 153 534 153 535 153 536 153 537 153 538 153 539 153 363 153 364 153 525 153 541 153 548
University Coll., Dublin (Eire)	469	153 094
University of Southern California Engineering Center, Los Angeles	434	153 446
University of Southern California School of Medicine, Los Angeles	399	153 511
Upper Air Lab., U. of Colorado, Boulder	434	153 442
Uppsala U. (Sweden)	464 472	150 694 153 310
Van Camp Labs., Terminal Island, Calif.	399	153 511
Vehicle Research Corp., Pasadena, Calif.	419	150 742
Vienna U., Austria	462	153 309
Vought Astronautics Div., Chance Vought Aircraft, Inc., Dallas, Texas	419	152 716
Washburn Observatory, Madison, Wis.	468	153 136
Washington U., Seattle	402 450 451	153 366 153 685 153 684
Washington U., Seattle, Coll. of Engineering	434	153 555
Washington U., Seattle, School of Medicine	399	153 335
Watertown Arsenal Labs., Mass.	445	153 263 171 186
Watervliet Arsenal, N.Y.	462	161 898
Wayne State U., Detroit, Mich.	451	150 725
Western Ontario U., Canada	436	153 636
Westinghouse Electric Corp., Baltimore, Md.	434	150 710-1 150 710-2
Westinghouse Research Labs., Pittsburgh, Pa.	434 447	171 364 171 391
Willow Run Labs., U. of Michigan, Ann Arbor	413	152 682
Wisconsin U., Madison	399 413 435 451	153 347 153 607 153 242 150 061
Woods Hole Oceanographic Institution, Mass.	413 414	147 311 153 134 153 762
Wyman-Gordon Co., North Grafton, Mass.	445	171 378

SUBJECT INDEX

Subject	Page	PB Number
609A vehicles	419	152 716
Ablative coatings	422	171 416
Absorption		
--Theory	468	153 657
Acceleration		
--Physiological effects	398	171 367
Acceleration tolerance		
--Physiological effects	399	147 778
Accelerometers		
--Errors	437	152 917
Acetates		
--Metabolism	400	153 526
		153 527
		153 528
		153 529
		153 530
	401	153 531
		153 532
		153 533
		153 534
		153 538
		153 539
	402	153 363
		153 364
		153 525
Acetone		
--Chemical reactions	410	153 157
Achievement tests		
--Development	394	148 771
Acrylic resins		
--Applications	443	153 286
Adapter units	427	153 950
Addition compounds	472	153 310
Aerial gunnery		
--Training devices	436	171 419
Aerial photographs		
--Alaska	441	153 540
Aerial photography		
--Theoretical corrections	478	171 385
Aerial reconnaissance		
--Alaska	411	153 371
--Equipment	427	153 396
Aerodynamic coefficients	454	171 407
Aerodynamic heating	454	149 676
--Countermeasures	438	171 363
	474	153 105
--Measurement	439	152 829
--Physical effects	454	171 407
Aerodynamics		
--Theory	454	171 415
Aeroelastic response	454	171 407
Aerospace life support	441	171 418
Air		
--Radiation	454	149 676
--Radioactivity	404	161 371-10
Air reactions	455	171 387
		171 388
Air traffic control systems		
--Communication systems	430	171 368
--Human engineering	417	150 920
Aircraft		
--Aerodynamic characteristics	455	171 387
		171 388
--Maintenance	392	153 547
--Materials	458	153 929
		161 229
	459	171 411
--Simulation	418	171 404
Aircraft materials		
--Fatigue	461	171 410
Airplane landings		
--Statistical analysis	416	171 370
Airplane panels		
--Sandwich construction	418	171 408
Airport control towers		
--Design	417	150 920
Algebra		
--Theory	449	153 306
		153 308
	450	153 458
Alkali metal carbonates		
--Phase studies	410	147 045
Alkali metal halide crystals		
--Photoconductivity	472	153 143
--Properties	471	171 371
--Sintering	471	171 371
Alkali metals		
--Spectra	468	153 136
Alkaline earth halides		
--Bonding	411	153 314
Alloys		
--Corrosion	461	151 103
--Deformation	462	161 896
--Stresses	461	151 103
	462	161 896
--Thermodynamic properties	458	153 929
Aluminum		
--Applications	441	171 418
--Temperature factors	470	171 360
Aluminum alloys		
--Fracture	460	153 167
Aluminum crystals		
---Creep	470	171 360
Aluminum-magnesium alloys		
--Deformation	460	171 399
Aluminum oxide films		
--Preparation	434	171 364
Aluminum oxides		
--Chemical reactions	408	171 373
Amines		
- Chemical reactions	409	153 451
Amino compounds		
--Applications	407	171 128
AN/ASG-15-T1	436	171 419
AN/GPM-15	424	171 244
AN/GSQ-16(XW-1)	451	150 086-7
	452	150 086-8
		150 086-9
AN/MRC-71	421	152 998
AN/PRM-10	424	171 242
AN/URM-26	424	171 246
AN/URM-26B	424	171 246
Analytic functions		
--Theory	449	153 306
Animals		
--Alaska	403	153 518
	441	153 540
--Parasites	403	153 518
Annihilation reactions		
--Analysis	464	150 694
--Theory	463	150 693
Anoxia		
--Physiological effects	397	171 392
	399	153 409
Antenna radiation patterns		
--Mathematical analysis	421	153 224
--Polarization	429	153 696
Antennas		
--Bibliography	429	152 719
--Design	420	153 712
	429	152 719
	434	153 235
	435	153 242
--Torque	431	150 319
Antibiotics		
--Effectiveness	403	153 192
Antimony		
--Bibliography	391	OTS-SB-438
Antimony chlorides		
--Crystal structure	472	153 310
Antiprotons		
--Nulcear reactions	463	150 693
	464	150 694
Antitrigonometric functions	449	153 754
Applied mathematics		
--Theory	465	154 291
Approximate computation		
--Applications	456	153 104
Aptitude tests		
--Applications	396	148 006
Arctic regions		
--Meteorology	413	150 723
Argon		
--Ionization	410	153 356
--Physical factors	408	149 731
Armored vehicles		
--Human engineering	398	153 469
Artificial kidney		
--Applications	403	153 193
Astronautics		
--Theory	439	153 055
Astronomical cameras		
--Design	478	152 588
Astrophysics		
--Bibliography	465	161 560
Asymmetrical force fields	472	154 297
Atmosphere		
--Arctic regions	413	150 723
--Bibliography	412	153 437
--Chemical reactions	406	150 690
--Electromagnetic properties	475	150 718
--Motion	413	150 723
--Radiation	412	153 634
--Radioactivity	464	171 361
		171 362
--Sampling	464	171 361
		171 362
--Spectrographic analysis	415	150 697
--Wave transmission	476	152 835
Atmospheric refraction		
--Optical effects	413	152 682
Atomic bomb explosions		
--Detection	462	153 395
--Physical effects	432	153 205
Atomic spectra		
--Analysis	467	153 153
Attention		
--Physiological factors	395	153 126
		153 141
Attitudes		
--Measurement	396	152 881
--Test methods	394	153 287
Audiences	394	153 287
Audiofrequency attenuators		
--Calibration	423	171 227
		171 228
--Test results	423	171 227
		171 228
Audiometers		
--Test methods	398	153 778
Auditory perception		
--Psychological factors	396	171 403
Auditory signals		
--Detection	466	153 170
Automation	476	152 876
Aviation personnel	393	153 853
--Performance	393	153 852
--Selection	393	153 852
Avoidance behavior	397	153 458
Axial flow compressors		
--Performance	468	152 874
Axially symmetric flow		
--Tables	457	152 838
Backward-wave amplifiers		
--Development	426	153 400
Balances		
--Calibration	405	171 236
Ballistic cameras		
--Applications	436	150 070
Ballistic data		
--Photographic analysis	436	150 070
Balloons		
--Applications	434	153 235
Band-pass filters		
--Design	430	150 692
Bang-bang system	425	153 438
	466	153 099
Barium carbonate		
--Chemical reactions	471	146 924
Barium titanates		
--Chemical reactions	471	146 924
--Phase studies	471	146 924
Barometers		
--Calibration	465	171 237
Bats		
--Ultrasonic properties	428	153 697
Beaches		
--Erosion	413	147 311
--Massachusetts	413	147 311
Beam-splitter	400	153 303
Beams		
--Vibration	484	153 501
Benzene derivatives		
--Spectra	409	152 611
Benzoic acids		
--Temperature factors	408	153 765
Benzyne	409	152 611
Beryllium		
--Mechanical properties	459	171 411
Beryllium alloys		
--Development	460	171 389
--Mechanical properties	460	171 389
Bibliography		
--Adjutant General s Office	393	153 440

Subject	Page	PB Number
Bibliography (con.)		
--Aerodynamic data	455	171 387
		171 388
--Antennas	429	152 719
--Astrophysics	465	161 560
--Atmosphere	412	153 437
--Centrifuges	391	154 409
--Chemical elements	391	OTS SB-438
--Chemical information searching	479	161 586
--Cutting tools	444	METAL
--Documentation	479	161 586
--Explosive forming	444	171 379
--Germanium	391	OTS SB-437
--Heat sinks	417	171 372
--High impact metal forming	444	171 379
--Human engineering	392	153 547
--Liquid-solid cyclone	391	154 409
--Magnesium	460	OTS SB-445
--Materials	417	171 372
--Metal cutting	444	METAL
--Metal plates	453	171 374
--Missiles	479	152 978
--National Bureau of Standards, Washington, D. C.	465	161 560
--Operations research	477	152 914
--Ozone	412	153 437
--Plasma (Physics)	465	161 560
--Quartermaster Corps textile reports	448	OTS SB-440
--Rockets	436	153 182
--Scientific reports	393	153 440
--Semiconductors	472	OTS SB-435
--Silicon	391	OTS SB-437
--Spirochetosis	404	150 062
--Systems engineering	477	152 914
		153 129
--Textiles	448	OTS SB-440
--Transducers	391	153 505
Bioenvironments	411	153 371
Bismuth		
--Bibliography	391	OTS SB-438
Blackbody radiation		
--Absorption	465	149 296
--Energy	465	149 296
--Sources	468	171 238
Blast effects		
--Countermeasures	432	153 205
	440	154 406
Blindness		
--Safety devices	427	153 101
Blood		
--Effects of radiation	404	153 301
Blood chemistry	400	153 303
--Genetic factors	399	153 347
Blood circulation		
--Measurement	399	153 365
Blood pressure		
--Measurement	399	153 365
Blunt bodies	456	153 106
		153 420
Bodies of revolution		
--Aerodynamic characteristics	455	152 844
--Boundary layer	456	154 403
--Hypersonic characteristics	456	153 106
		153 420
Body temperature		
--Climatic factors	397	153 373
Bombing		
--Training devices	439	153 086
Boolean formulas	450	153 458
Boron		
--Bombardment	446	153 439
Boron carbides		
--Phase studies	447	171 365
Boron compounds (Organic)		
--Chemical reactions	406	153 215
		153 216
Boron hydrides		
--Toxic effects	396	153 174
Boron nitrides		
--Synthesis	434	171 364
Boron phosphide		
--Synthesis	434	171 364
Boundary layer		
--Turbulence	456	150 982
Brain		
--Effects of radiation	404	153 304
Bremsstrahlung		
--Intensity	472	153 426
Broadband antennas		
--Analysis	429	153 696
	434	153 555
Bronze		
--Catalytic properties	472	153 147
Budget control	444	150 713
Bunny boots	464	153 516
Burns		
--Pathology	403	153 192
	404	153 194
Calibration		
--Instrumentation	424	171 233
		171 234
		171 235
Capacitors		
--Development	428	150 709
Capital structure	479	153 148
Carbinols		
--Chemical reactions	406	153 265
--Isomerism	405	153 156
Carbohydrates		
--Metabolism	401	153 537
		153 538
	402	153 541
		153 548
Carbon		
--Determination	405	171 409
--Temperature factors	407	154 056
Carbon dioxide		
--Analysis	399	153 335
Cardiac muscle		
--Physiology	396	153 174
Cargo		
--Transportation	442	153 145
Cascode amplifier	421	150 704
Castings		
--Production	458	151 098
Cathode ray tube screens		
--Visibility	431	143 302
Cathodes (Electron tubes)		
--Materials	467	153 683
Centrifuges		
--Bibliography	391	154 409
Ceramic materials		
--Development	465	150 922
--Mechanical properties	446	171 398
--Stability	446	171 405
--Temperature factors	446	171 405
	447	171 365
--Thermal properties	422	171 416
Cerebral cortex		
--Physiology	397	153 468
Cerenkov radiation	462	152 866
Cesium cloud	414	150 721
Cesium halides		
--Color	470	147 174
Chalcopyrites	471	150 323
Chemical reactions		
--Analysis	407	171 376
	408	171 373
Chemistry	479	161 586
Chlorine isotopes		
--Resonance	409	150 921
--Spectra	409	150 921
Chlorophylls		
--Photochemical reactions	400	153 127
Chromatographic analysis		
--Applications	405	171 409
Chromium plating		
--Ultrasonic factors	445	153 223
Circulatory system		
--Climatic factors	397	153 369
--Physical factors	398	171 367
--Physiology	396	153 174
Clays		
--Crystal structure	470	147 173
Cleaning fluids		
--Development	407	171 128
Climate		
--Alaska	411	153 514
	412	153 324
--Greenland	412	153 093
Clouds		
--Radiation	415	153 061
--Temperature	415	153 061
Coanda effect	417	154 292
Coanda nozzle	457	153 378
Cobalt compounds		
--Spectra	410	149 648
Cobalt oxides		
--Phase studies	470	147 759
Colimycin	403	153 192
Colloids		
--Applications	442	153 441
Color centers	470	147 174
Combat skills	398	153 469
Combustion		
--Mathematical analysis	447	153 299
--Stability	447	154 410
		154 411
Communication systems		
--Performance	465	152 688
Complex component development	427	171 380
Complex ions		
--Decomposition	472	154 297
--Spectra	409	147 776
	410	149 648
Compressible flow		
--Tables	454	153 477
Concrete		
--Test results	418	153 178
Conferences	477	152 927
Confinement	398	153 469
Conical bodies		
--Structural analysis	453	153 357
Containers		
--Materials	441	171 418
Control systems		
--Applications	445	171 378
--Design	434	153 442
--Human engineering	392	153 165
--Synthesis	425	153 438
	466	153 099
Coolants		
--Chemical analysis	405	154 408
Copper-nickel alloys		
--Magnetic properties	466	153 281
Copper plating		
--Ultrasonic factors	445	153 223
Correlation functions		
--Applications	451	153 560
Corrosion		
--Physical factors	460	153 167
Cosmic radiation		
--Measurement	392	148 496
--Photographic analysis	463	153 171
--Tables	392	148 496
Cosmic radiation showers		
--Statistical analysis	449	153 365
Coupling circuits		
--Design	421	152 998
Crocco variables	456	153 104
Cross slip mechanism	470	171 360
Crystal detectors		
--Equipment	420	153 227
Crystal holders		
--Development	420	153 227
Crystal structure		
--Analysis	472	154 297
Crystals		
--Excitation	465	150 922
--Resonance	409	150 921
--Surface properties	472	154 297
Curb detectors	427	153 101
Curie points	466	153 281
Curpistor diode timers	437	153 478
Cutting tools		
--Bibliography	444	METAL
Cybernetics	392	153 165
	476	152 876
Cyclic compounds		
--Solvent properties	405	153 156
Cylinders		
--Structural analysis	453	153 357
Cylindrical shells		
--Stresses	453	153 119
Data		
--Processing	452	153 361
		153 455
	479	153 770
Data storage systems		
--Circuits	463	150 708
--Development	440	152 689
--Equipment	451	150 086-7
		150 086-8
	452	150 086-9
--Theory	479	153 770
Data transmission systems		
--Mathematical analysis	426	153 722
Day		
--Measurement	412	153 093
Dehydrogenases		
--Biochemistry	400	153 164
De-icing systems		
--Test results	416	153 289
Delay elements		
--Development	437	152 654

Subject	Page	PB Number
Delay lines		
--Applications	432	171 420
--Development	432	171 420
Delta modulators	421	153 004
Detectors		
--Development	427	153 101
Detergents		
--Effectiveness	407	171 128
Determinants		
--Analysis	450	150 711
--Theory	449	153 305
	450	153 711
Diabase concrete pavement	418	153 178
Dickite	470	147 173
Dielectrics		
--Electrical properties	425	153 417
--Synthesis	434	171 364
Dies		
--Forging	445	171 378
--Machining	445	171 378
Diet		
--Alaska	441	153 523
Differential equations	476	148 525
--Analysis	454	171 415
--Theory	449	147 121
	450	153 414
	450	153 711
Diffusion		
--Analysis	446	171 400
Digestive system		
--Physiology	399	153 511
Dilatometers		
--Design	470	147 759
Diodes		
--Applications	433	147 244
Dipole antennas		
--Radiation	421	153 224
Discharge tubes		
--Applications	429	153 245
Diseases		
--Alaska	403	153 407
		153 513
Distributed amplifiers		
--Circuits	431	150 720
--Development	421	150 704
Documentation	479	152 978
		171 478
--Bibliography	479	161 586
--Theory	391	153 505
	479	153 770
Doploc	422	153 494
	436	150 724
Doppler tracking systems		
--Applications	436	150 724
--Performance	422	150 066
Drops		
--Combustion	442	153 441
--Oscillation	458	153 162
Dutch door	393	153 323
Ear		
--Acoustic factors	397	171 392
--Physical factors	399	147 778
Earth		
--Radiation	392	150 772
	412	153 634
Earthquakes		
--Simulation	411	153 422
Echinococcus	403	153 507
Ecology		
--Alaska	411	153 371
Economic conditions		
--Statistical analysis	479	153 148
Ejection seats		
--Test results	418	153 404
Elastic plates	453	171 374
Elasticity		
--Mathematical analysis	453	152 904
--Theory	453	171 374
Electric discharges		
--Energy	466	153 073
Electric insulators		
--Materials	434	171 364
Electrical networks		
--Synthesis	422	153 175
Electromagnetic fields		
--Optical properties	476	152 781
Electromagnetic theory	474	171 395
Electromagnetic waves		
--Mathematical analysis	414	150 071
--Propagation	475	150 718
	476	152 781
Electron beams		
--Applications	433	150 716
--Energy	467	152 931
Electron beams (con.)		
--Interference	426	153 400
--Mathematical analysis	433	150 715
--Production	430	153 504
Electron bombardment		
--Applications	467	153 397
Electron guns		
--Design	430	153 504
Electron tubes		
--Development	432	153 240
--Reliability	426	154 484-1
		154 484-2
--Theory	467	152 931
Electronic camera	478	152 588
Electronic circuits		
--Development	431	150 720
	433	147 244
--Mathematical analysis	422	150 066
Electronic commutators		
--Development	430	150 707
Electronic equipment		
--Applications	427	153 101
--Blast effects	432	153 205
--Design	427	171 380
--Testing equipment	420	150 703
Electronic switches		
--Theory	425	153 579
Electrons		
--Density	415	153 484
	432	153 498
--Magnetic moments	467	153 291
--Resonance	467	153 291
Electrophilic displacement	406	153 215
		153 216
Equivalent networks	422	153 175
Ergodic theorem	478	153 360
Eskimos		
--Alaska	478	153 367
--Culture	478	153 520
		153 521
--Nutrition	441	153 523
--Physiology	399	153 347
	403	153 515
Ethyl fluorides		
--Dipole moments	467	153 153
--Microwave spectra	467	153 153
Ethyl nitrates		
--Propellant properties	438	152 316
Ethylene oxide		
--Optical properties	405	150 656
Euclidean space	450	153 433
Euler's angles		
--Applications	418	171 404
Evacuation bag	465	153 510
Exit taxiways	417	171 369
Experimental data Analysis	477	153 633
Explosions		
--Pressure	476	152 835
--Theory	438	153 111
Explosive charges		
--Applications	444	171 379
Explosive forming	444	171 379
Explosives		
--Blast	438	171 326
--Sensitivity	438	153 111
		171 326
--Test methods	438	171 326
Exposure		
--Biochemical effects	400	153 526
		153 527
		153 528
		153 529
		153 530
	401	153 531
		153 532
		153 533
		153 534
		153 535
		153 536
		153 537
		153 538
		153 539
	402	153 363
		153 366
		153 525
		153 541
		153 548
--Countermeasures	465	153 510
--Physiological effects	397	153 373
		153 545
	398	153 372
	399	153 511
Exposure suits		
--Test results	464	153 508
Exterior ballistics		
--Determination	455	171 387
		171 388
Extraterritorial waters	479	153 121
Eye		
--Blood circulation	400	153 303
--Motion	399	147 778
F-centers	470	152 604
	472	153 143
F3H-2N	416	153 289
Fatigue (Mechanics)		
--Test methods	461	171 410
Fatty acids		
--Biochemical effects	402	153 363
		153 364
--Metabolism	400	153 526
		153 527
		153 528
		153 529
		153 530
	401	153 531
		153 532
		153 533
		153 534
		153 535
		153 536
		153 537
		153 539
	402	153 525
		153 541
--Oxidation	402	153 548
Fermi age theory	463	147 900
Fermi-Yang theory	462	153 309
Ferrites		
--Machining	444	150 706
Ferrocenes		
--Chemical reactions	406	153 265
Ferromagnetic films		
--Optical properties	471	153 284
Ferromagnetic materials		
--Analysis	465	150 922
	459	171 025
--Magnetic properties	466	153 281
Ferry service	435	152 320
		152 321
Fire control		
--Equipment	439	153 086
Fire control computers		
--Design	436	171 419
Fixed capacitors		
--Calibration	422	171 239
--Test results	422	171 239
Flame propagation	437	152 654
Flight attitude indicators		
--Equipment	418	171 404
Flight paths		
--Determination	435	152 320
		152 321
Flight vehicle materials	461	171 410
Fluid flow		
--Mathematical analysis	443	152 525
	473	153 074
Fluid mechanics	457	153 261
Fluids		
--Conductivity	473	153 074
--Wave transmission	475	147 400
Flutter		
--Mathematical analysis	454	171 407
Flying platforms		
--Test results	419	150 075
Food		
--Containers	441	171 418
Free jet impingement	417	153 083
Free radicals		
--Production	408	152 685
Frequency meters		
--Calibration	423	171 231
		171 240
	424	171 229
		171 230
		171 232
--Test results	423	171 231
		171 240
	424	171 229
		171 230
		171 232
Frequency modulation receivers		
--Test methods	426	153 241
Friction		
--Temperature factors	469	171 474

Subject	Page	PB Number
Fuels		
--Toxic effects	396	153 174
--Transportation	447	153 078
Functions		
--Analysis	450	153 711
--Theory	449	153 754
Fundus camera	400	153 303
Gallium		
--Bibliography	391	OTSSB-438
Gas analyzers		
--Design	399	153 335
Gas bearings		
--Stability	442	153 128
Gas cycle cooling	438	171 363
Gas discharges		
--Applications	429	153 245
Gas flow		
--Measurement	468	152 874
--Tables	454	153 477
Gas ionization		
--Applications	419	152 319
Gas turbines		
--Performance	443	152 525
Gases		
--Absorptive properties	415	153 283
--Specific heat	454	153 477
--Spectra	468	153 136
		153 657
Genetics		
--Alaska	399	153 347
Geometrical optics	476	152 781
Germanium		
--Bibliography	391	OTS SB-437
--Conductivity	475	171 377
Glass		
--Dielectric properties	472	154 297
--Effects of radiation	446	153 439
Glycolysis		
--Temperature factors	397	153 545
Goggles		
--Arctic regions	464	153 509
Goiter	403	153 515
Grains (Metallurgy)		
--Stresses	470	171 360
Graphite		
--Thermal properties	445	171 390
Gravity		
--Physical effects	474	171 395
Grinders		
--Development	444	150 706
Ground effect phenomena	419	150 075
Gyroscopes		
--Development	419	154 298
Gyrotron	419	154 298
Halogen compounds (Organic)		
--Chemical reactions	407	171 376
Halogens		
--Ionization potential	469	153 397
Hasp	464	171 361
		171 362
Hearing		
--Physiology	397	171 392
Heart		
--Physiology	397	153 369
Heat of sublimation		
--Determination	407	154 056
Heat resistant alloys		
--Casting	458	151 098
--Europe	446	161 233
--Fatigue	461	171 410
--Phase studies	447	171 391
Heat sinks	417	171 372
Heat transfer		
--Measurement	439	152 829
	474	171 395
Helicopters		
--Performance	416	154 405
Helium		
--Thermodynamic properties	474	153 105
Helium (Liquid)		
--Dielectric properties	475	153 166
--Motion	409	152 608
Helium ions		
--Motions	409	152 608
Helmets		
--Acoustic properties	465	152 688
--Equipment	465	152 668
Helminth parasites	402	153 522
Hepatitis		
--Alaska	403	153 543
High altitude		
--Exploration	416	153 334
--Instrumentation	426	153 231
High pressure research	459	171 025
High temperature research	472	153 426
Honest John	437	150 097
Honeycomb structures	418	171 408
Human engineering		
--Arctic regions	392	153 547
--Bibliography	392	153 547
Hydatid disease	403	153 507
Hydrates		
--Spectra	409	147 776
Hydrodynamics		
--Theory	458	153 650
Hydrogen		
--Chemical reactions	408	150 923
--Determination	405	171 409
--Oxidation	406	150 690
Hydrogen bonding	408	148 021
Hydrogen embrittlement		
--Analysis	461	171 394
Hydrogen ions		
--Determination	410	153 356
Hydroxyl radicals		
--Excitation	408	150 923
Hydroxyl radicals		
--Spectra	408	150 923
Hypersonic flow		
--Mathematical analysis	456	153 106
		153 184
		153 420
	457	153 315
Hypersonic nozzles		
--Design	457	152 838
Hypersonic wind tunnels		
--Calibration	417	153 435
--Equipment	457	152 838
Hypervelocity projectiles		
--Penetration	440	153 316
Hypervelocity vehicles		
--Cooling	438	171 363
--Flutter	454	171 407
--Materials	417	171 372
	445	171 390
--Stresses	437	151 101
Hypothermia		
--Applications	398	153 544
--Physiological effects	397	153 369
	398	153 544
	399	153 542
HYVIA	451	153 560
Ice		
--Alaska	411	153 480
--Greenland	411	153 480
Ice crystals		
--Physical properties	408	148 021
Iconoscopes		
--Development	425	171 386
Igniters		
--A-1-A	437	152 654
--Development	437	152 654
Image isocon tube	425	171 386
Image size	478	171 385
Impact shock		
--Physical effects	440	153 316
Impedance		
--Measurement	422	171 245
	429	152 693
Indium		
--Bibliography	391	OTS SB-438
Indium antimonides		
--Electrical properties	469	171 406
Industrial production		
--Costs	444	150 713
Industrial psychology	444	150 713
Information theory	426	153 722
	452	153 361
	478	153 360
	479	153 770
Infrared detectors		
--Calibration	468	171 238
Infrared equipment		
--Calibration	468	171 238
--Design	399	153 335
Infrared spectra		
--Analysis	412	153 634
	415	150 697
	468	153 657
Infrared spectroscopy		
--Applications	468	153 136
--Theory	467	153 392
		153 393
Infrared waves		
--Absorption	415	153 283
	468	153 657
--Measurement	415	153 061
Instruments		
--Calibration	405	171 236
	422	171 239
		171 241
		171 243
		171 245
	423	171 224
		171 225
		171 226
		171 227
		171 228
		171 231
		171 240
	424	171 229
		171 230
		171 232
		171 233
		171 234
		171 235
		171 242
		171 244
		171 246
	465	171 237
	468	171 238
Insulating compounds		
--Development	434	171 364
Integral equations	476	148 525
--Analysis	451	150 061
--Tables	465	149 296
	449	147 121
Intelligence tests		
--Effectiveness	396	148 007
--Statistical analysis	394	148 018
Interior ballistics		
--Mathematical analysis	447	153 299
Intermetallic compounds		
--Electrical properties	471	150 323
	461	171 393
International Geophysical Year	392	148 406
Interplanetary maneuvers	439	153 055
Ion beams		
--Production	419	152 319
--Thermal effects	419	152 319
Ionic collisions	436	153 636
Ionosphere		
--Analysis	415	153 484
--Electromagnetic properties	414	150 071
--Ionization	415	153 197
--Reflective effects	415	161 583
	432	153 609
Ionospheric disturbances		
--Analysis	432	153 498
Iron-nickel alloys		
--Crystal structure	471	153 284
Iron-vanadium alloys		
--Magnetic properties	466	153 281
J71	416	153 289
Jet engines		
--Exhaust gases	418	153 179
Jet mixing flow		
--Analysis	457	153 261
Jet streams (Meteorology)		
--Turbulence	413	150 691
Job analysis		
--Psychological factors	393	153 853
Journal bearings		
--Lubrication	442	153 128
Kidneys		
--Pathology	403	153 193
--Physiology	399	153 542
Laminar boundary layer		
--Heat transfer	456	153 104
--Mathematical analysis	455	153 092
	456	153 184
Landing fields		
--Greenland	411	153 480
Language		
--Coding	451	150 086-7
		150 086-8
	452	150 086-9
Laval nozzles		
--Heat transfer	475	154 294
Lebesgue integral	451	150 061
Light		
--Intensity	413	152 682
--Meteorological factors	413	152 682
Limnology		
--Alaska	413	153 481
Line broadening	467	153 392
		153 393
Liquid metals		
--Solvent properties	409	161 990

Subject	Page	PB Number
Liquid metals (con.)		
--Thermodynamic properties	409	161 990
Liquid rocket propellants		
--Combustion	447	154 410
		154 411
Liquid-solid cyclone	391	154 409
Liquids		
--Atomization	442	153 441
--Heat transfer	474	171 395
--Viscosity	458	153 162
Lithium		
--Precipitation	470	147 120
Liver		
--Biochemistry	400	153 526
		153 527
		153 528
		153 529
		153 530
	401	153 531
		153 532
		153 533
		153 534
		153 535
		153 536
		153 537
		153 538
	402	153 363
		153 364
		153 525
		153 541
--Physiology	397	153 545
	401	153 539
	402	153 548
Logistics		
--Mathematical analysis	442	153 145
Low temperature research	408	153 765
Luminescence		
--Analysis	440	153 316
Lunik III	440	153 492
Lymph		
--Electrical properties	397	171 392
Machine translations	451	150 086-7
		150 086-8
	452	150 086-9
Machines		
--Control systems	445	171 378
--Human engineering	392	153 165
Magnesium		
--Bibliography	460	OTS SB-445
Magnesium alloys		
--Fracture	460	153 167
Magnetic modulators		
--Development	430	153 454
Magnetic resonance		
--Measurement	409	147 776
	410	149 648
Magneto-hydrodynamic waves		
--Analysis	443	152 830
--Mathematical analysis	473	153 074
Magnetostriction		
--Theory	466	150 695
Magnetrons		
--Development	432	150 699
Maintenance		
--Arctic regions	392	153 547
Maintenance personnel		
--Training	393	153 779
Management engineering		
--Theory	479	153 148
Manganese		
--Economic aspects	444	147 534
Manometers		
--Design	418	152 873
Markov chains	450	153 358
Mass energy relations	442	140 719
Mass spectrometers		
--Design	468	150 700
Mass transfer	457	153 315
Materials		
--Bibliography	417	171 372
--Development	428	150 709
--Friction	469	171 474
--Heat transfer	417	171 372
--Stresses	460	153 077
--Ultrasonic analysis	445	171 186
Mathematical computer data		
--Coding	428	152 974
--Processing	391	152 827
	438	153 220
	451	153 560
Mathematical computers		
--Applications	413	150 060
Mathematical computers (con.)		
--Applications (con.)	414	153 134
	440	152 689
	451	150 086-7
		150 086-8
	452	150 086-9
	479	161 586
--Circuits	452	153 206
--Design	476	152 876
--Development	452	153 361
--Scheduling	443	153 181
	451	153 002
Mathematical predication		
--Applications	440	153 492
--Theory	450	150 714
Matrix algebra		
--Applications	450	150 711
MD-1	464	153 508
Medical cameras		
--Equipment	400	153 303
Memory		
--Test methods	394	153 287
Merchant vessels		
--Scheduling	442	153 145
Meso-meteorological network	412	153 232
Mesons		
--Decay	464	150 694
--Nuclear reactions	464	150 694
--Theory	462	153 309
Metabolism		
--Climatic factors	402	153 366
Metal plates		
--Bibliography	453	171 374
Metalorganic compounds		
--Synthesis	406	153 265
Metals		
--Adsorptive properties	408	152 685
--Diffusion	446	171 400
	459	171 025
--Fracture	459	171 366
--Machining	444	METAL
--Microstructure	461	171 381
--Processing	444	171 379
--Radiographic analysis	461	171 381
--Stresses	437	151 101
	459	171 366
	460	153 077
	462	161 896
--Temperature factors	458	153 929
Meteorological balloons		
--Applications	392	148 496
--Tracking	411	150 705
Meteorological data	412	153 232
Meteorological radar		
--Applications	432	153 498
--Development	411	153 394
--Effectiveness	412	153 239
Michigan	413	152 682
Microradiography		
--Applications	461	171 381
Microwave amplifiers		
--Design	433	147 243
--Development	432	153 240
	433	147 244
		150 716
	434	153 446
Microwave equipment		
--Design	435	153 242
--Development	421	153 001
Microwaves		
--Attenuation	423	171 224
		171 225
		171 226
		171 227
		171 228
--Propagation	475	171 377
Military personnel	393	153 440
--Alaska	393	153 323
		153 329
--Arctic regions	397	153 373
--Attitudes	393	153 323
		153 329
--Performance	398	153 469
Military research	477	152 927
Military training		
--Effectiveness	393	153 779
Milk		
--Radioactivity	404	161 371-10
Millstone Hill	438	153 220
Minerals		
--Polymorphism	470	147 173
Miniature electronic equipment		
--Circuits	427	171 380
Missile launchers		
--Performance	436	153 161
Missiles		
--Aerodynamic characteristics	436	153 425
--Bibliography	479	152 978
--Hydrodynamic characteristics	436	153 161
--Materials	458	161 229
--Tracking	436	150 070
Modulators		
--Circuits	421	153 004
--Development	421	153 001
Molecular association		
--Energy	456	153 106
Molecular crystals	409	150 921
Molecular spectroscopy	436	153 636
Molecular weight		
--Determination	406	171 401
Molecules		
--Adsorption	408	152 685
--Ionization potential	467	153 397
Molten carbonates	410	147 045
Molybdenum		
--Casting	458	151 098
Molybdenum alloys		
--Thermal properties	445	171 390
Molybdenum-titanium alloys		
--Physical properties	458	161 229
Motion pictures		
--Psychological effects	396	152 881
Motor reactions		
--Temperature factors	394	153 321
Multipath transmission		
--Mathematical analysis	428	153 225
NA 39	418	153 404
Naval equipment		
--Shock resistance	441	149 520
Naval personnel		
--Training	393	153 779
Naval research	480	171 316
Naval structural mechanics	452	147 401
Navier-Stokes equations	457	153 459
Neel temperature	470	147 759
Neutron bombardment		
--Physical effects	446	153 439
Neutron diffraction analysis		
--Applications	471	152 982
Neutron spectrometers		
--Design	471	152 982
Neutrons		
--Motion	463	147 900
--Pathological effects	404	153 301
--Spectra	464	171 397
Nickel oxides		
--Phase studies	470	147 759
Niobium		
--Casting	458	151 098
Nitric acid		
--Analysis	448	153 948
--Storage	448	153 948
		153 949
Nitrogen ions		
--Determination	410	153 356
Nitrogen oxychlorides		
--Decomposition	448	153 173
Noise (Radio)		
--Measurement	426	153 400
--Sources	432	153 169
Non-destructive testing		
--Applications	418	171 408
	445	171 186
Nozzles		
--Design	417	154 292
Nuclear physics	462	152 865
Nuclear propulsion		
--Analysis	442	150 719
--Economic aspects	462	153 407
--Theory	443	152 830
Nuclear spectroscopy	463	171 402
Nuclei (Biology)		
--Stimulation	397	153 468
Obstacles		
--Detection	427	153 101
Ocean waves		
--Mathematical analysis	413	150 060
Oceanographical data		
--Atlantic Ocean	414	153 762
--Processing	413	150 060
	414	153 134
Officer personnel		
--Selection	394	148 771
Offshore claims	479	153 121
Operations research	450	150 714

Subject	Page	PB Number
Operations research (con.)		
--Bibliography	477	152 914
Organic compounds		
--Analysis	405	171 409
--Chemical analysis	405	154 408
Oxidation-reduction reactions	410	154 295
Oxides		
--Spectra	414	150 721
	469	153 094
--Surface properties	410	154 295
Oxygen		
--Determination	400	153 303
--Toxic effects	399	153 409
Oxygen (Liquid)		
--Containers	406	153 354
Oxygen equipment		
--Development	406	153 354
Ozone		
--Bibliography	412	153 437
--Chemical reactions	408	150 923
Packaging		
--Materials	441	153 198
Parabolic bodies		
--Stresses	453	153 386
Paramagnetic crystals		
--Spectra	467	153 291
	468	152 836
Parametric amplifiers	422	153 494
	434	153 446
Parasitology		
--Alaska	402	153 522
	403	153 507
		153 518
Partial differential equations		
--Applications	464	171 397
--Theory	449	153 306
		153 308
Particle trajectories		
--Photographic analysis	463	153 171
Particles		
--Analysis	468	150 700
--Density	462	154 407
--Detection	463	153 171
--Diffusion	462	154 407
--Measurement	462	154 407
--Motion	392	150 722
Particles (Airborne)		
--Radioactivity	464	171 361
		171 362
Pemmican	441	153 512
Perception		
--Psychological factors	392	153 470
Permalloy films	471	153 284
Personality tests		
--Analysis	394	153 322
Perturbation theory		
--Applications	428	153 421
	442	153 128
	484	153 501
Phase detectors		
--Circuits	422	150 066
Phase shifters		
--Analysis	428	153 421
Phosphine oxides		
--Crystal structure	472	153 310
Phosphors		
--Applications	452	152 928
--Effectiveness	431	143 302
Photochemical reactions	409	152 611
--Analysis	406	150 690
Photochemistry	407	171 376
Photoconductivity	469	153 094
Photodeboronation	406	153 215
		153 216
Photographic emulsions		
--Applications	464	150 694
--Bombardment	462	153 151
Photographic film		
--Processing	478	171 385
Photomultipliers		
--Development	463	153 131
--Sensitivity	463	171 402
Photons		
--Applications	442	150 719
--Energy	462	154 407
Photosynthesis		
--Analysis	400	153 127
Pilots		
--Training	439	153 086
Planck radiation function	465	149 296
Planets		
--Radar analysis	391	152 827
Plants		
--Alaska	397	153 524
Plants (con.)		
--Alaska (con.)	441	153 540
--Nutritive value	397	153 524
Plasma (Physics)	434	153 446
	443	152 830
	472	153 426
--Bibliography	465	161 560
--Properties	473	153 098
--Temperature factors	474	153 466
--Theory	473	150 688
	474	153 466
Plasma oscillations		
--Mathematical analysis	473	154 404
Plastic films		
--Applications	441	153 198
Plasticity		
--Temperature factors	453	147 362
--Theory	452	147 401
	453	147 362
	465	154 291
Platinotron	432	153 240
Pointing control	434	153 442
Poiseuille flow	456	150 982
Polariscopes		
--Circuits	392	152 872
Political science	479	153 121
Polymers		
--Crystal structure	405	150 656
--Molecular weight	406	171 401
--Optical properties	405	150 656
Polynomials		
--Analysis	449	153 305
Position indicators		
--Performance	430	171 368
Potassium chloride crystals		
--Color	470	152 604
--Photoconductivity	470	152 604
	472	153 143
Power series		
--Theory	449	153 306
Power supplies		
--Development	429	150 689
Preamplifiers		
--Performance	422	153 494
Precipitation		
--Radar analysis	412	153 239
Pressure		
--Measurement	465	171 237
--Physical effects	459	171 025
Pressure gages		
--Calibration	465	171 237
--Test results	454	150 067
Primates		
--Effects of radiation	404	153 301
Printed circuits		
--Materials	427	171 380
Privation		
--Biochemical effects	402	153 363
--Physiological effects	398	153 469
Probability (Statistics)		
--Applications	432	153 205
--Theory	450	153 358
		153 359
	478	153 360
Projectiles		
--Velocity	437	152 917
Propellant grains		
--Combustion	447	153 299
Propellants		
--Handling	438	152 316
Propellers (Aerial)		
--Wake	418	152 873
Propyl nitrates		
--Propellant properties	438	152 316
Protective clothing		
--Arctic regions	464	153 508
	465	153 510
Protective shelters		
--Arctic regions	420	153 517
Proton accelerators		
--Development	436	153 636
Proton beams		
--Attenuation	462	153 151
Protons		
--Nuclear reactions	463	150 693
--Pathological effects	404	153 304
--Resonance	409	147 776
--Scattering	462	153 151
Pseudomonas		
--Sensitivity	403	153 192
Pseudomonas infections		
--Pathology	404	153 194
--Therapy	403	153 192
Psychoacoustics	396	171 403
	466	153 170
Psychomotor tests		
--Analysis	398	153 469
Psychotherapy		
--Psychological factors	395	153 168
Public health		
--Preservation	404	161 371-1
Pulse communication systems		
--Mathematical analysis	421	153 000
Pulse generators		
--Analysis	430	153 454
--Development	430	150 707
Pulse modulation		
--Coding	430	150 707
		153 084
Pulse system theory	421	153 000
Pulse transmitters		
--Design	430	153 084
Pyrites		
--Electrical properties	471	150 323
QK-324	432	150 699
QK-702	432	150 699
QRC-29	425	150 698
Quantum mechanics	463	147 900
--Theory	473	153 728
Quantum nature	425	171 386
Quartz crystals		
--Aging	430	150 064
--Friction	469	171 474
--Temperature factors	430	150 064
Quartz resonators		
--Frequency shift	430	150 064
Radar display systems		
--Visibility	431	143 302
Radar display systems (Airborne)		
--Performance	430	171 366
Radar duplexers		
--Development	429	153 229
		153 245
Radar echo areas		
--Mathematical analysis	476	152 835
--Theory	414	150 071
Radar equipment		
--Development	455	152 620
Radar mapping		
--Applications	427	153 396
Radar receivers		
--Design	428	153 697
Radar scanning		
--Equipment	420	153 712
	451	153 560
Radar signals		
--Detection	428	153 217
--Processing	428	153 225
Radar tracking systems		
--Applications	438	153 220
Radial thrust	439	153 055
Radiation belt	392	150 722
Radio astronomy	428	153 225
	429	152 719
--Instrumentation	392	152 872
Radio interference		
--Measurement	433	150 712
Radio navigation systems (Airborne)		
--Equipment	430	171 366
Radio relay systems		
--Equipment	421	152 998
Radio transmission		
--Meteorological factors	475	150 718
Radio transmitters (Shipborne)		
--Development	434	150 710-1
		150 710-2
Radio waves		
--Propagation	414	150 071
--Scattering	415	161 583
	432	153 609
Radiofrequency amplifiers		
--Test results	434	150 710-2
Radiofrequency attenuators		
--Calibration	423	171 224
		171 225
		171 226
--Test results	423	171 224
		171 225
		171 226
Radiofrequency filters		
--Design	435	153 242
Radiofrequency oscillators		
--Calibration	424	171 242
--Test results	424	171 242
Radiofrequency pulses		
--Detection	428	152 974

Subject	Page	PB Number
Radiological contamination		
--Countermeasures	404	161 371-10
Radiosondes		
--Equipment	426	153 231
Radomes (Airborne)		
--Stresses	422	171 416
Random distribution		
--Theory	413	150 060
Rare earth compounds		
--Chemical reactions	410	153 157
--Stability	410	153 157
Rations (Military)		
--Arctic regions	441	153 512
RBF-3	427	153 950
		153 951
Reactors		
--Equipment	463	150 708
Recruiting		
--Psychological factors	393	153 329
Re-entry aerodynamics	417	171 372
	455	152 620
Refractory materials	446	171 400
--Applications	467	153 683
--Casting	458	151 098
--Europe	446	161 233
--Phase studies	447	171 391
--Physical properties	445	171 413
--Thermal properties	445	171 390
--Vapor pressure	445	171 413
Reliability		
--Determination	453	153 357
--Statistical analysis	451	150 725
Respiration		
--Temperature factors	397	153 545
Rhodium compounds (Organic)		
--Spectra	409	147 776
Riemann surfaces	450	153 433
Rocket motors		
--Performance	447	154 410
		154 411
--Test methods	443	153 286
Rocket oxidizers		
--Test methods	448	153 948
		153 949
Rocket propellants		
--Combustion	442	153 441
		153 493
--Development	443	153 181
--Stability	442	153 493
Rocket propelled sleds		
--Aerodynamic characteristics	443	152 790
--Applications	418	153 404
--Performance	443	153 290
Rocket propulsion		
--Theory	442	150 719
		153 441
Rocket trajectories		
--Mathematical analysis	439	153 388
Rockets		
--Bibliography	436	153 182
--Motion	436	153 182
Rodents		
--Parasites	402	153 522
Runways		
--Design	416	171 370
	417	171 369
--Location	417	171 369
--Materials	418	153 178
Salivary glands		
--Physiology	399	153 302
Salmonella		
--Alaska	403	153 513
Sampling (Statistics)	479	171 478
Sandwich panels		
--Test methods	418	171 408
Sapphires		
--Friction	469	171 474
Satellite ferry	435	152 320
		152 321
Satellite vehicle research	435	153 408
Satellite vehicle trajectories		
--Analysis	439	150 702
--Determination	436	150 070
		150 724
	438	153 220
	440	153 492
--Statistical analysis	439	153 218
		153 219
--Theoretical corrections	435	153 774
Satellite vehicles	439	153 055
--Bibliography	436	153 182
--Cooling	438	171 363
Satellite vehicles (con.)		
--Detection	422	153 494
--Flight paths	435	152 320
		152 321
--Heat transfer	438	153 952
--Motion	436	153 182
	439	150 702
--Temperature	438	153 952
--Tracking	438	153 220
Scientific personnel		
--Attitudes	393	152 686
--Psychological factors	393	152 686
--Selection	393	152 686
Scientific reports		
--Bibliography	393	153 440
--Coding	479	152 978
--Processing	479	171 478
Scientific research	477	153 633
	480	171 316
Scintillation counters		
--Applications	463	150 708
	463	153 171
Seadac	440	152 689
Seakeeping	440	152 689
Sedimentation		
--Physical properties	413	147 311
Seismic waves		
--Analysis	411	153 422
--Sources	411	153 422
Seismographs		
--Applications	462	153 395
Selenium		
--Bibliography	391	OTS SB-438
Semiconductors		
--Bibliography	472	OTS SB-435
--Catalytic properties	472	153 147
--Crystal structure	469	153 552
--Electrical properties	421	153 001
	469	171 406
	475	171 377
--Impurities	470	147 120
--Mathematical analysis	432	153 169
--Temperature factors	469	171 187
Servomechanisms		
--Applications	434	153 442
SG-21/U generator	422	171 243
		171 243
Shaped charge liners		
--Performance	436	150 068
Sheets		
--Heat treatment	459	171 396
--Hypersonic characteristics	457	153 315
--Laminar boundary layer	455	153 092
Ship hulls		
--Design	441	153 632
--Structural analysis	440	153 953
Ships		
--Blast effects	441	149 520
--Design	440	153 953
--Performance	440	152 689
Shock tubes		
--Applications	439	152 829
Shock waves		
--Chemical effects	448	153 173
Shock waves		
--Measurement	474	153 466
--Physical effects	408	149 731
--Propagation	476	148 525
--Properties	466	153 073
--Thermal effects	454	149 676
Shoes		
--Cleaning	464	153 516
Signal generators		
--Calibration	422	171 241
		171 243
	424	171 244
--Test results	422	171 241
		171 243
	424	171 244
Signal generators (RF)		
--Calibration	424	171 246
--Test results	424	171 246
Silica gels		
--Surface properties	410	154 295
Silicon		
--Bibliography	391	OTS SB-437
--Impurities	470	147 120
Silicon carbides		
--Phase studies	447	171 365
Silver chloride crystals		
--Deformation	472	153 564
Silver electrodes		
--Electrical properties	407	152 871
Silver oxides		
--Electrochemistry	407	152 871
Single crystals		
--Color	470	147 174
--Creep	446	171 398
Sky		
--Radiation	416	153 334
--Temperature	416	153 334
Sleeping bags		
--Test results	465	153 510
Snow		
--Trafficability	420	171 375
Snow drags	420	171 375
Snow roads		
--Development	420	171 375
Snow shelters	420	153 517
Social communication		
--Psychological factors	395	153 168
--Test methods	394	153 287
Sodium cloud	414	150 721
Solar batteries		
--Development	429	153 645
--Standards	429	153 645
Solar flares		
--Electromagnetic effects	415	153 197
Solar furnaces		
--Design	474	153 465
Solar noise data		
--Analysis	392	152 872
Solids		
--Elasticity	465	154 291
--Mathematical analysis	465	154 291
--Wave transmission	453	152 904
	475	147 400
	476	148 525
--X-ray analysis	471	152 982
Sonar personnel		
--Performance	395	153 126
		153 141
Sonar signals		
--Detection	395	153 141
Sound		
--Propagation	475	147 400
--Psychological effects	396	171 403
Sounding rockets		
--Equipment	434	153 442
Space charges		
--Electromagnetic effects	430	153 504
Space flight	439	153 055
--Simulation	435	153 408
Space perception		
--Analysis	394	153 424
--Test methods	392	153 470
Spaceships		
--Equipment	441	171 418
--Materials	437	151 101
Spectrophotometers		
--Applications	409	153 451
Spectroscopy		
--Applications	465	150 922
Speech		
--Intelligibility	478	153 430
Speech transmission		
--Intelligibility	452	153 455
Spheres		
--Preparation	444	150 706
Spirochetosis		
--Bibliography	404	150 062
Spotting charges		
--Materials	437	150 097
Squid	445	153 173
Stainless steel		
--Fracture	460	153 167
--Welding	445	153 263
Standing wave ratios		
--Measurement	424	171 233
		171 234
		171 235
Statistical analysis		
--Applications	449	153 385
--Theory	450	150 711
Steel		
--Heat treatment	459	171 396
--Tensile properties	459	171 396
Step scanner	463	150 708
Storage tubes		
--Development	452	152 928
Strategic materials	444	147 534
Stress analysis	460	153 077
--Applications	453	153 386
--Theory	452	147 401
Stress concentration factors	461	171 410
Stress strain curves	462	161 896
Strip mapping	427	153 396

Subject	Page	PB Number
Structural shells		
--Stresses	453	153 734
STU-1	431	153 221
Submarines		
--Blast effects	441	149 520
--Propulsion	462	153 407
Sulfur compounds (Organic)		
--Chemical reactions	409	153 451
Supersonic airfoils		
--Drag	454	150 069
--Stability	454	150 069
Supersonic flow		
--Mathematical analysis	456	154 403
--Tables	454	153 477
Supersonic nozzles		
--Analysis	457	153 378
Surfaces (Mathematics)		
--Theory	450	153 433
Survival		
--Arctic regions	397	153 524
	441	153 540
--Dietary factors	397	153 524
Switches (RF)		
--Test results	425	150 698
Switching circuits		
--Applications	451	153 002
--Theory	425	153 579
Synchrotrons		
--Design	462	152 866
Systems engineering		
--Bibliography	477	152 914
	477	153 129
Tantalum		
--Casting	458	151 098
Target recognition		
--Visual factors	395	147 533
Targets		
--Detection	428	153 225
	431	143 302
Tektronix 180A generator	422	171 241
Telemeter systems		
--Equipment	430	150 707
	434	153 235
Telemetering receivers		
--Equipment	427	153 950
--Operation	427	153 951
Tellurides		
--Electrical properties	471	150 323
Tellurium		
--Bibliography	391	OTS SB-438
TEM diode	425	153 579
Terrestrial magnetism		
--Analysis	392	150 722
Territorial waters	479	153 121
Test sets		
--Design	433	150 712
--Development	420	150 703
Test vehicles		
--Test facilities	419	152 716
Tests		
--Design	477	152 927
Textiles		
--Bibliography	448	OTS SB-440
--Deterioration	448	171 417
Theodolites		
--Applications	411	150 705
Thermal radiation	474	154 293
--Determination	412	153 324
--Measurement	474	161 228
Thermal stresses		
--Analysis	422	171 416
Thermionic emission		
--Mathematical analysis	467	153 683
Thermochemistry	407	171 376
Thermodynamics		
--Theory	473	150 688
Thin films		
--Optical properties	469	153 094
Thyroid glands		
--Physiology	403	153 515
--Climatic factors	398	153 372
Time mark generator	422	171 241
Time series		
--Applications	450	150 714
Timers	437	153 478
Timing circuits	437	153 478
--Development	430	153 084
--Maintenance	431	153 221
--Operation	431	153 221
Titanium		
--Plating	445	153 223
Titanium alloys		
--Forging	459	151 100
--Mechanical properties	461	171 394
--Metallurgical analysis	460	171 412
Toeplitz matrices	449	153 305
Topology		
--Theory	450	153 685
	451	153 684
Torque		
--Mathematical analysis	453	153 734
--Measurement	431	150 319
Tracers (Ordnance)		
--Applications	436	150 068
Track chamber	435	153 408
Tracking		
--Psychological factors	395	147 533
Tracks (Aerodynamics)		
--Design	435	153 408
Training devices		
--Human engineering	436	171 419
--Simulation	418	171 404
Transducers		
--Bibliography	391	153 505
Transformations (Mathematics)		
--Theory	450	153 412
Transistors		
--Applications	433	150 712
Transmission lines		
--Mathematical analysis	433	147 243
Transparent rocket motor	443	153 286
Transportation		
--Scheduling	447	153 078
Traumatic shock		
--Countermeasures		153 193
Traveling wave tubes		
--Development	425	171 414
Tungsten		
--Casting	458	151 098
--Chemical reactions	408	171 373
Tungsten bronzes	472	153 147
Tungsten oxides		
--Catalytic properties	472	153 147
Turbine blades		
--Drag	443	152 525
Turbojet engines		
--De-icing systems	416	153 289
Turbulent boundary layer		
--Heat transfer	474	153 105
--Shear stresses	456	150 982
U-2	464	171 361
		171 362
Ultra high frequency communication systems		
--Performance	455	152 620
Ultrasonics		
--Applications	445	171 186
--Instrumentation	428	153 697
Ultraviolet radiation		
--Chemical effects	448	171 417
Underground structures		
--Blast effects	440	154 406
Underwater communication systems		
--Development	431	153 954
Underwater explosions		
--Blast	441	149 520
Universal algebra	450	153 458
Upper atmosphere		
--Instrumentation	434	153 442
--Spectrographic analysis	414	150 721
Urethane polymers		
--Applications	443	153 286
Vacuum systems		
--Testing equipment	419	152 319
Variable resistors		
--Calibration	422	171 245
Vehicles		
--Aerodynamic characteristics	455	171 387
Vehicles (con.)		
--Aerodynamics characteristics	455	171 388
Ventilation ducts		
--Design	440	154 406
Vertical take-off planes		
--Landing	417	153 083
--Lift	418	152 873
--Performance	419	150 742
Very high frequency communication systems		
--Test facilities	432	153 609
Vibration		
--Mathematical analysis	453	153 734
	454	153 501
Vigilance performance	395	153 126
Visual perception		
--Meteorological factors	413	152 662
--Test methods	392	153 470
Voice communication systems		
--Coding	452	153 455
--Equipment	431	153 954
Voice data processing systems	452	153 455
Vortices		
--Mathematical analysis	457	153 459
--Motion	457	153 459
Vowel discrimination	478	153 430
Water		
--Purification	440	153 519
		153 546
Water activated batteries		
--Development	426	153 231
Water supplies		
--Radioactivity	404	161 371-10
Water vapor		
--Photolysis	406	150 690
Water waves		
--Mathematical analysis	458	153 159
--Physical effects	413	147 311
--Resistance	458	147 125
--Velocity	458	147 125
Waveguide slots		
--Impedance	429	152 693
Waveguides		
--Electromagnetic properties	427	152 727
--Excitation	429	152 693
--Mathematical analysis	434	153 555
--Wave transmission	425	153 417
Wear mechanics	469	171 474
Weather forecasting		
--Errors	411	153 204
--Statistical analysis	413	153 607
Weather stations		
--Location	412	153 232
Wedges		
--Supersonic characteristics	454	150 069
Welded joints		
--Test results	445	153 263
West Ford	439	153 218
		153 219
Wiener-Hopf method	449	147 121
Wind		
--Determination	413	153 607
--Measurement	411	150 705
Wind tunnels		
--Applications	477	153 633
--Equipment	454	150 067
Wings		
--Lift	418	152 873
Wire		
--Tensile properties	444	161 230
Wronskian	450	153 711
Wullenweber antenna	425	150 698
Zinc oxides		
--X-ray analysis	469	153 552

NUMBER INDEX

Number	Page
AAL 7-7951	416
AAL 7-7951, R-1	399
AAL 22-0601-0002, R-1	394
AAL 22-1301-0003, R-1, series 2	393
AAL-TN-56-1	403
AAL-TN-56-2	464
AAL-TN-56-3	464
AAL-TN-56-4	465
AAL-TN-56-5	399
AAL-TN-56-6	441
AAL-TN-56-7	403
AAL-TN-56-8	411
AAL-TN-56-9	403
AAL-TN-56-10	464
AAL-TN-56-11	420
AAL-TN-56-12	403
AAL-TN-56-13	440
AAL-TN-56-14	478
AAL-TN-56-15	478
AAL-TN-56-16	402
AAL-TN-56-17	441
AAL-TN-56-18	397
AAL-TN-56-19	402
AAL-TN-56-20	400
AAL-TN-56-21	400
AAL-TN-56-22	400
AAL-TN-56-23	400
AAL-TN-56-24	400
AAL-TN-56-25	401
AAL-TN-56-26	401
AAL-TN-56-27	401
AAL-TN-56-28	401
AAL-TN-56-29	401
AAL-TN-56-30	401
AAL-TN-56-31	401
AAL-TN-56-32	401
AAL-TN-56-33	401
AAL-TN-56-34	441
AAL-TN-56-36	402
AAL-TN-56-37	399
AAL-TN-56-38	403
AAL-TN-56-39	398
AAL-TN-57-4	397
AAL-TN-57-5	440
AAL-TN-57-12	392
AAL-TN-57-36	402
AAL-TR-57-5	399
AAL-TR-57-6	402
AAL-TR-57-7	402
AAL-TR-57-8	399
AAL-TR-57-12	402
AAL-TR-57-14	478
AAL-TR-57-27	397
AAL-TR-57-32	411
AAL-TR-57-36	398
AAL-TR-57-37	397
AD-49 219	448
AD-110 608	416
AD-120 462	473
AD-148 606	420
AD-152 041	454
AD-152 546	415
AD-158 775	462
AD-203 345	392
AD-207 456	464
AD-209 328	442
AD-210 118	425
AD-210 145	466
AD-211 496	413
AD-211 606	463
AD-212 194	450
AD-213 643	454
AD-217 243	434
AD-217 321	473
AD-217 345	421
AD-217 980	433
AD-218 013	410
AD-218 970	421
AD-219 319	411
AD-219 846L	430
AD-220 282	444
AD-220 345	409
AD-225 106	451
AD-225 462	444
AD-226 573	408
AD-227 279	406
AD-227 709	464
AD-228 402	432
AD-229 180	431
AD-230 162	462
AD-230 385	457
AD-231 247	396
AD-231 388	436
AD-231 464	413
AD-231 465	468
AD-231 493	467
AD-231 875	453
AD-231 895	414
AD-232 041	468
AD-232 064	431
AD-232 419	400
AD-232 467	469
AD-232 646	392
AD-232 656	442
AD-232 657	475
AD-232 663	400
AD-232 746	456
AD-232 752	458
AD-232 897	472
AD-232 924	475
AD-233 061	436
AD-233 132	462
AD-233 187	476
AD-233 212	410
AD-233 222	463
AD-233 243	475
AD-233 406	405
AD-233 434	414
AD-233 501	463
AD-233 505	477
AD-233 608	468
AD-233 687	479
AD-233 722	418
AD-233 862	449
AD-233 898	407
AD-234 086	395
AD-234 087	395
AD-234 112	472
AD-234 179	433
AD-234 191	433
AD-234 250	453
AD-234 380	442
AD-234 463	477
AD-234 481	413
AD-234 659	460
AD-234 691	393
AD-234 693	398
AD-234 795	408
AD-234 865	454
AD-234 866	436
AD-234 894	436
AD-234 938	451
AD-234 957	470
AD-235 010	422
AD-235 058	454
AD-235 064	451
AD-235 065	451
AD-235 066	452
AD-235 210	419
AD-235 391	453
AD-235 447	392
AD-235 581	450
AD-235 651	432
AD-235 654	463
AD-235 774	466
AD-235 848	448
AD-235 860	474
AD-236 193	470
AD-236 205	449
AD-236 206	410
AD-236 215	458
AD-236 263	458
AD-236 323	470
AD-236 458	471
AD-236 500	453
AD-236 727	475
AD-236 728	452
AD-236 811	413
AD-237 052	409
AD-237 059	470
AD-237 414	463
AD-237 445	395
AD-237 728	444
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AD-237 968	394
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AD-239 399	447
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AD-244 482	443
AD-244 494, superseded	439
AD-244 549	421
AD-244 586	455
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AD-244 642	462
AD-244 736	419
AD-244 841	409
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AD-245 156	440
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AD-246 224	473
AD-246 254	439
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AD-246 505	403
AD-246 507	404
AD-246 510	422
AD-246 513	425
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AD-246 591	443
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AD-246 622	457
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AD-246 643	473
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AD-246 653	478
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AD-246 779	428
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AD-246 896	467
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AD-247 075	410
AD-247 121	438
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AD-247 315	450
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AD-247 381	411
AD-247 424	425
AD-247 425	425
AD-247 471	457
AD-247 550	422
AD-247 577	440
AD-247 590	458
AD-247 593	430
AD-247 898	436
AD-247 913	456
AEDC-TN-58-9	454
AERDL-1626-TR	447
AERDL-1643-TR	460
AF-TSEAC4-4461-5-1	417
AFBMD-7-4059	434
AFCCDD-TN-60-34	435
AFCCDD-TN-60-39	478
AFCCD-TN-60-1020	452
AFCRC-TN-58-486	413
AFCRC-TR-58-233	415
AFCRC-TR-59-222	413
AFCRC-TR-59-353	475
AFCRC-TR-59-405	414
AFCRL-TN-60-261	413
AFCRL-TN-60-467	413
AFCRL-TN-60-497	453
AFCRL-TN-60-630	467
AFCRL-TN-60-631	411
AFCRL-TN-60-632	462
AFCRL-TN-60-649	476
AFCRL-TN-60-670	415
AFCRL-TN-60-674	415
AFCRL-TN-60-685	434
AFCRL-TN-60-691	415
AFCRL-TN-60-800	473
AFCRL-TN-60-815	468
AFCRL-TN-60-963	451
AFCRL-TN-60-967	476
AFCRL-TN-60-970	450
AFCRL-TN-60-991	472
AFCRL-TN-60-1102	426
AFCRL-TN-60-1114	452
AFCRL-TN-60-1115	422
AFCRL-TN-60-1117	434
AFCRL-TN-60-1120	430
AFCRL-TN-60-1121	427
AFCRL-TN-60-1127	425
AFCRL-TN-60-1131	473
AFCRL-TN-60-1132	440
AFCRL-TN-60-1134	432
AFCRL-TN-60-1155	467
AFCRL-TR-60-168	408
AFCRL-TR-60-170	452
AFCRL-TR-60-205	411
AFCRL-TR-60-278	467
AFCRL-TR-60-352	452
AFCRL-TR-60-353	427
AFCRL-TR-60-364	420
AFCRL-TR-60-405	412
AFCRL-TR-60-415	440
AFCRL-TR-60-423	467
AFMDC-TN-60-13	474
AFMDC-TN-60-14	435
AFMDC-TR-59-4	442
AFMDC-TR-60-21	399
AFMDC-TR-60-23	419
AFOSR-TN-58-952	392
AFOSR-TN-58-1077	464
AFOSR-TN-59-85	466
AFOSR-TN-59-224	463
AFOSR-TN-59-746	408
AFOSR-TN-60-164	431
AFOSR-TN-60-334	408
AFOSR-TN-60-484	436
AFOSR-TN-60-707	471
AFOSR-TN-60-846	456
AFOSR-TN-60-854	409
AFOSR-TN-60-878	467
AFOSR-TN-60-930	472
AFOSR-TN-60-956	457
AFOSR-TN-60-960	456
AFOSR-TN-60-960, pt. 2	425
AFOSR-TN-60-962	462
AFOSR-TN-60-991	409
AFOSR-TN-60-1035	450
AFOSR-TN-60-1064	450
AFOSR-TN-60-1094	474
AFOSR-TN-60-1100	455
AFOSR-TN-60-1103	427
AFOSR-TN-60-1117	470
AFOSR-TN-60-1169	421
AFOSR-TN-60-1171	426
AFOSR-TN-60-1195	456
AFOSR-TN-60-1213	450
AFOSR-TN-60-1227	457
AFOSR-TN-60-1241	410
AFOSR-TN-60-1243	450
AFOSR-TN-60-1244	450
AFOSR-TN-60-1245	478
AFOSR-TN-60-1261	434
AFOSR-TN-60-1266	450
AFOSR-TN-60-1270	406
AFOSR-TN-60-1337	458
AFOSR-TN-60-1342	439
AFOSR-TN-60-1346	406
AFOSR-TN-60-1352	459
AFOSR-TN-60-1355	394

Number	Page
AFOSR-TN-60-1362	411
AFOSR-TN-60-1365	406
AFOSR-TN-60-1371	472
AFOSR-TN-60-1373	467
AFOSR-TN-60-1383	449
AFOSR-TN-60-1402	484
AFOSR-TN-60-1403	447
AFOSR-TN-60-1406	404
AFOSR-TN-60-1407	449
AFOSR-TR-57-20	473
AFOSR-TR-59-84	456
AFOSR-TR-60-2	457
AFOSR-TR-60-95	443
AFOSR-TR-60-111	471
AFOSR-TR-60-126	407
AFOSR-TR-60-129	394
AFOSR-TR-60-131	468
AFOSR-TR-60-136	457
AFOSR-TR-60-160	446
AFOSR-TR-60-169	449
AFSAM-60-29	399
AFSAM-60-60	404
AFSAM-60-85	399
AFSAM-60-87	400
AIL-7601-H-1	416
AIR-244-58-FR-177	420
AIR-290-60-FR-225	392
AMC-TR-60-7-667a	445
AMRD-PM-12	413
AOHEL-TM-17-60	398
AOHEL-TM-18-60	392
ARA-720	436
ARCRL-TR-60-412	411
ARF-2152-10	460
ARL-TN-60-119	449
ARL-TN-60-149	456
ARL-TR-60-290	419
ARL-TR-60-313	435
ARL-TR-60-316	471
ARL-TR-60-319	435
ARL-TR-60-321	459
ARL-TR-60-324	478
ARPA-SFS-7	436
ARPA-SFS-8	422
ARPA-SFS-19	422
ASRDL-2041	421
ASRDL-2043	421
ASRDL-2047	411
ASRDL-2049	444
ASRDL-2087	475
ASRDL-2099	421
ASRDL-2114	421
ASRDL-2115	451
ASRDL-2141	421
ATI-114 680	407
ATI-148 927	465
ATI-152 755	417
ATI-153 158	475
ATI-159 367	410
ATI-179 543	472
ATI-210 349	474
Avco RR-42	454
BBN-780	422
BN-197	408
BR-NYU-34	427
BRL-1093	422
BRL-1095	454
BRL-1114	436
BRL-1116	442
BRL-MR-1237	436
BRL-MR-1242	436
BRL-MR-1245	454
BRL-MR-1300	466
BRL-TN-869	440
BRL-TN-1304	436
BRL-TN-1354	422
Bulers TB-60-3	394
CCL-98	407
Court-27	417
CRDLR-3043	396
CU-1-60	453
CU-15-60	449
CU-1-60-ONR-266(08)	476
CU-1-60-ONR-266(34)	476
CVA AST/EOR-13081	419
DaCL-124	443
DaSa-529	464
DaSa-531	464
DaSa-730	440
DaSa-1052	462
DaSa-1190	465
DMIC-139	458
DMIC-141	459
DMIC-142	437
DMIC-144	461
DMIC-M-78	474
DMIC-M-79	458
DMIC-M-80	444
DMIC-M-83	446
DOFL-TR-857	437
DOFL-TR-874	425
DOFL-TR-875	437
DOFL-TR-888	469
DOFL-TR-895	437
DOFL-TR-898	391
DSR-7-8120	468
DTMB-1353	440
DTMB-C-555	440
EE-433	414
EE-461	392
EM-161	476
EP-123	465
ERP-RM-14	444
ESL MIT-7976-60-5	451
ESL MIT-8494-R-1	451
F-TR-2264-1A-1	407
FAA Task D-2-5213	430
FDRG-60-4	456
FI I-A2049-11	442
FRL-TR-17	437
FRL-TR-18	438
FRL-TR-21	438
FRL-TR-22	453
FRL-TR-25	438
GM-TM-162	434
GRD GRP-69	467
GTEL TR-60-204.6	408
GWU-T-113/60	442
HH-60-15	417
HSR-RR-60/1-am	477
ICP-1252, superseded	422
IER-18-7	471
IER-60-298	426
IER-60-303	467
IER-108-4	470
IER-150-2	471
IRL-142	415
JPL M-4-29	427
JPL M-4-43	427
JPL PR-20-229	448
JPL PR-20-248	447
JPL PR-20-274	447
JPL PR-20-294	438
JPL R-20-72	448
LIR TR-136	428
LIR TR-148	470
LIR TR-149	470
LIR TR-150	470
LL-3G-0002	415
LL-21G-0011	455
LL-21G-0019, superseded	439
LL-21G-0027	439
LL-21G-0028	439
LL-22G-0039	438
LL-34G-0005	391
LL-46G-0008	429
LL-47G-0006	428
LL-47G-0007	428
LL-47G-0010	428
LL-53G-0042	471
LL-84G-0013	428
LL-TR-234	428
LMSD-4507	453
LMSD-288 184	429
LMSD-288 264	429
LMSD-703 013	455
LMSD-703 036	439
LMSD-703 045	444
LMSD-703 047	417
Lock SB-60-25	444
Lock SB-60-29	417
Lock SRB-60-3	412
MEDEW-RS-4-59	403
MEDEW-RS-5-59	403
MEDEW-RS-6-60	404
MEWD-1033	436
ML-732	430
ML-747	473
ML-755	458
MRL(ORO)-71	463
MDOP-1851, superseded	423
MUP TR-200	467
NAMC-ACEL-439	406
NATTS-ATL-47	416
NAVORD-2031	456
NAVWEPS-5974	430
NAVWEPS-7043	443
NAVWEPS-7563	443
NAVWEPS-7564	443
NAVWEPS-7566	418
NAVWEPS SSL-AC-05	422
NAVWEPS SSL-AF-21	423
NAVWEPS SSL-AG-47	422
NAVWEPS SSL-AG-48	424
NAVWEPS SSL-AG-51	422
NAVWEPS SSL-AZ-09	422
NAVWEPS SSL-GG-06	424
NAVWEPS SSL-HA-01	423
NAVWEPS SSL-HA-03	423
NAVWEPS SSL-HA-05	423
NAVWEPS SSL-HA-06	423
NAVWEPS SSL-HA-07	423
NAVWEPS SSL-HF-04	424
NAVWEPS SSL-HF-05	424
NAVWEPS SSL-HF-06	423
NAVWEPS SSL-HF-07	424
NAVWEPS SSL-HV-02	424
NAVWEPS SSL-HV-04	424
NAVWEPS SSL-HV-06	424
NAVWEPS SSL-NM-02	405
NAVWEPS SSL-NP-02	465
NAVWEPS SSL-NR-01	468
NBS-6062	430
NBS-TN-59	465
NBS-TN-82	415
NBS-TN-85	479
NCEL-R-089	418
NCEL-R-109	420
NOLC-478	430
NOTS-701	456
NOTS-TA-7	443
NOTS-TP-2343	439
NOTS-TP-2434	443
NOTS-TP-2458	443
NOTS-TP-2519	430
NOTS-TP-2531	431
NOTS TP-2532	443
NOTS TP-2533	443
NOTS TP-2536	418
NOTS TP-2582	462
NRCC MA-243	477
NRCC MB-225	441
NRL-5413	431
NRL-5532	465
NRL-5545	441
NRL-5549	431
NRL-5555	409
NSF Y/9.5/80	414
NSL-443	456
NSL-454	474
NSL-462	456
NSRDF ER-2.5082	441
NWL-1724	479
OORR 60-2	477
OORR 1597: 10M	450
OORR-2125.6-M	439
OORR-2211.1-P	468
OSURF-778-1	415
OTAC-RR-28	461
OTS CTR-340, suppl.	472
OTS SB-435	472
OTS SB-437	391
OTS SB-438	391
OTS SB-440	448
OTS SB-445	460
PATR-1401, rev. 2	438
PB 143 302	431
PB 146 924	471
PB 147 045	410
PB 147 120	470
PB 147 121	449
PB 147 125	458
PB 147 173	470
PB 147 174	470
PB 147 243	433
PB 147 244	433
PB 147 311	413
PB 147 362	453
PB 147 400	475
PB 147 401	452
PB 147 533	395
PB 147 534	444
PB 147 759	470
PB 147 776	409
PB 147 778	399
PB 147 900	463
PB 148 006	396
PB 148 007	396
PB 148 018	394
PB 148 021	408
PB 148 496	392
PB 148 525	476
PB 148 771	394
PB 149 296	465
PB 149 520	441
PB 149 648	410
PB 149 676	454
PB 149 731	408
PB 150 060	413
PB 150 061	451
PB 150 062	404
PB 150 064	430
PB 150 066	422
PB 150 067	454
PB 150 068	436
PB 150 069	454
PB 150 070	436
PB 150 071	414
PB 150 075	419
PB 150 086-7	451
PB 150 086-8	451
PB 150 086-9	452
PB 150 097	437
PB 150 319	431
PB 150 323	471
PB 150 656	405
PB 150 688	473
PB 150 689	429
PB 150 690	406
PB 150 691	413
PB 150 692	430
PB 150 693	463
PB 150 694	464
PB 150 695	466
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PB 150 698	425
PB 150 699	432
PB 150 700	468
PB 150 702	439
PB 150 703	420
PB 150 704	421
PB 150 705	411
PB 150 706	444
PB 150 707	430
PB 150 708	463
PB 150 709	428
PB 150 710-1	434
PB 150 710-2	434
PB 150 711	430
PB 150 712	433
PB 150 713	444
PB 150 714	450
PB 150 715	433
PB 150 716	433
PB 150 718	475
PB 150 719	442
PB 150 720	431
PB 150 721	414
PB 150 722	392
PB 150 723	413
PB 150 724	436
PB 150 725	451
PB 150 742	419
PB 150 920	417
PB 150 921	409
PB 150 922	465
PB 150 923	408
PB 150 982	456
PB 151 098	458
PB 151 100	459
PB 151 101	437
PB 151 103	461
PB 152 316	438
PB 152 319	419
PB 152 320	435
PB 152 321	435
PB 152 525	443
PB 152 588	478
PB 152 604	470
PB 152 608	409
PB 152 611	409
PB 152 620	455
PB 152 654	437
PB 152 682	413
PB 152 685	408
PB 152 686	393
PB 152 688	465
PB 152 689	440
PB 152 693	429
PB 152 716	419
PB 152 719	429
PB 152 727	427
PB 152 781	476
PB 152 790	443
PB 152 827	391
PB 152 829	439
PB 152 830	443
PB 152 835	476
PB 152 836	468
PB 152 838	457
PB 152 844	455
PB 152 866	462
PB 152 871	407
PB 152 872	392
PB 152 873	418
PB 152 874	468
PB 152 876	476
PB 152 881	396
PB 152 904	453
PB 152 914	477
PB 152 917	437
PB 152 927	477
PB 152 928	452
PB 152 931	467
PB 152 974	428
PB 152 978	479
PB 152 982	471
PB 152 998	421
PB 153 000	421
PB 153 001	421
PB 153 002	451
PB 153 004	421
PB 153 055	439
PB 153 061	466
PB 153 073	473
PB 153 074	460
PB 153 077	447
PB 153 078	417
PB 153 083	430
PB 153 084	439
PB 153 086	455
PB 153 092	412
PB 153 093	469
PB 153 094	473
PB 153 098	466
PB 153 099	427
PB 153 101	456
PB 153 104	474
PB 153 105	456
PB 153 106	438
PB 153 111	453
PB 153 119	479
PB 153 121	395
PB 153 126	400
PB 153 127	442
PB 153 128	477
PB 153 129	463
PB 153 131	

Number	Page
PB 153 134	414
PB 153 136	468
PB 153 141	395
PB 153 143	472
PB 153 145	442
PB 153 147	472
PB 153 148	479
PB 153 151	462
PB 153 153	467
PB 153 156	405
PB 153 157	410
PB 153 159	458
PB 153 161	436
PB 153 162	458
PB 153 164	400
PB 153 165	392
PB 153 166	475
PB 153 167	460
PB 153 168	395
PB 153 169	432
PB 153 170	466
PB 153 171	453
PB 153 173	448
PB 153 174	396
PB 153 175	422
PB 153 178	418
PB 153 181	445
PB 153 182	436
PB 153 184	456
PB 153 192	403
PB 153 193	403
PB 153 194	404
PB 153 197	415
PB 153 198	441
PB 153 204	411
PB 153 205	432
PB 153 206	452
PB 153 215	406
PB 153 216	406
PB 153 217	428
PB 153 218	439
PB 153 219	439
PB 153 220	438
PB 153 221	431
PB 153 223	445
PB 153 224	421
PB 153 225	428
PB 153 227	420
PB 153 229	429
PB 153 231	426
PB 153 232	412
PB 153 235	434
PB 153 239	412
PB 153 240	432
PB 153 241	426
PB 153 242	435
PB 153 245	429
PB 153 261	457
PB 153 263	445
PB 153 265	406
PB 153 281	466
PB 153 283	415
PB 153 284	471
PB 153 286	443
PB 153 287	394
PB 153 289	416
PB 153 290	443
PB 153 291	467
PB 153 299	447
PB 153 301	404
PB 153 302	399
PB 153 303	400
PB 153 304	404
PB 153 305	449
PB 153 306	449
PB 153 308	449
PB 153 309	462
PB 153 310	472
PB 153 314	411
PB 153 315	457
PB 153 316	440
PB 153 321	394
PB 153 322	394
PB 153 323	393
PB 153 324	412
PB 153 329	393
PB 153 334	416
PB 153 335	399
PB 153 347	399
PB 153 354	406
PB 153 356	410
PB 153 357	453
PB 153 358	450
PB 153 359	450
PB 153 360	478
PB 153 361	452
PB 153 363	402
PB 153 364	402
PB 153 365	399
PB 153 366	402
PB 153 367	478
PB 153 369	397
PB 153 371	411
PB 153 372	398
PB 153 373	397
PB 153 378	457
PB 153 385	449
PB 153 386	453
PB 153 388	439
PB 153 392	467
PB 153 393	467
PB 153 394	411
PB 153 395	462
PB 153 396	427
PB 153 397	467
PB 153 400	426
PB 153 404	418
PB 153 407	462
PB 153 408	435
PB 153 409	399
PB 153 412	450
PB 153 414	450
PB 153 417	425
PB 153 420	456
PB 153 421	428
PB 153 422	411
PB 153 424	394
PB 153 425	436
PB 153 426	472
PB 153 430	478
PB 153 433	450
PB 153 435	417
PB 153 437	412
PB 153 438	425
PB 153 439	446
PB 153 440	393
PB 153 441	442
PB 153 442	434
PB 153 446	434
PB 153 451	409
PB 153 454	430
PB 153 455	452
PB 153 458	450
PB 153 459	457
PB 153 465	474
PB 153 466	474
PB 153 468	397
PB 153 469	398
PB 153 470	392
PB 153 477	454
PB 153 478	437
PB 153 480	411
PB 153 481	413
PB 153 484	415
PB 153 492	440
PB 153 493	442
PB 153 494	422
PB 153 498	432
PB 153 501	454
PB 153 504	430
PB 153 505	391
PB 153 507	403
PB 153 508	464
PB 153 509	464
PB 153 510	465
PB 153 511	399
PB 153 512	441
PB 153 513	403
PB 153 514	411
PB 153 515	403
PB 153 516	464
PB 153 517	420
PB 153 518	403
PB 153 519	440
PB 153 520	478
PB 153 521	478
PB 153 522	402
PB 153 523	441
PB 153 524	397
PB 153 525	402
PB 153 526	400
PB 153 527	400
PB 153 528	400
PB 153 529	400
PB 153 530	400
PB 153 531	401
PB 153 532	401
PB 153 533	401
PB 153 534	401
PB 153 535	401
PB 153 536	401
PB 153 537	401
PB 153 538	401
PB 153 539	401
PB 153 540	441
PB 153 541	432
PB 153 542	399
PB 153 543	403
PB 153 544	398
PB 153 545	397
PB 153 546	440
PB 153 547	392
PB 153 548	402
PB 153 552	469
PB 153 555	434
PB 153 560	451
PB 153 564	472
PB 153 579	425
PB 153 607	413
PB 153 609	432
PB 153 632	441
PB 153 633	477
PB 153 634	412
PB 153 636	463
PB 153 645	429
PB 153 650	458
PB 153 657	468
PB 153 683	467
PB 153 684	451
PB 153 685	450
PB 153 696	429
PB 153 697	428
PB 153 711	450
PB 153 712	420
PB 153 722	426
PB 153 728	473
PB 153 734	453
PB 153 744	435
PB 135 754	449
PB 153 762	414
PB 153 765	408
PB 153 770	479
PB 153 778	398
PB 153 779	393
PB 153 852	393
PB 153 853	393
PB 153 929	458
PB 153 948	448
PB 153 949	448
PB 153 950	427
PB 153 951	427
PB 153 952	438
PB 153 953	440
PB 153 954	431
PB 154 056	407
PB 154 291	465
PB 154 292	417
PB 154 293	474
PB 154 294	475
PB 154 295	410
PB 154 297	472
PB 154 298	419
PB 154 403	456
PB 154 404	473
PB 154 405	416
PB 154 406	440
PB 154 407	462
PB 154 408	405
PB 154 409	391
PB 154 410	447
PB 154 411	447
PB 154 484-1	426
PB 154 484-2	426
PB 161 228	474
PB 161 229	458
PB 161 230	444
PB 161 233	446
PB 161 371-10	404
PB 161 560	465
PB 161 583	415
PB 161 586	479
PB 161 896	462
PB 161 990	409
PB 171 025	459
PB 171 128	407
PB 171 186	445
PB 171 187	469
PB 171 224	423
PB 171 225	423
PB 171 226	423
PB 171 227	423
PB 171 228	423
PB 171 229	424
PB 171 230	424
PB 171 231	423
PB 171 232	424
PB 171 233	424
PB 171 234	424
PB 171 235	424
PB 171 236	405
PB 171 237	465
PB 171 238	468
PB 171 239	422
PB 171 240	423
PB 171 241	422
PB 171 242	424
PB 171 243	422
PB 171 244	424
PB 171 245	422
PB 171 246	424
PB 171 316	480
PB 171 326	438
PB 171 360	470
PB 171 361	464
PB 171 362	464
PB 171 363	438
PB 171 364	434
PB 171 365	447
PB 171 366	459
PB 171 367	398
PB 171 368	430
PB 171 369	417
PB 171 370	416
PB 171 371	471
PB 171 372	417
PB 171 373	408
PB 171 374	453
PB 171 375	420
PB 171 376	407
PB 171 377	475
PB 171 378	445
PB 171 379	444
PB 171 380	427
PB 171 381	461
PB 171 385	478
PB 171 386	425
PB 171 387	455
PB 171 388	455
PB 171 389	460
PB 171 390	445
PB 171 391	447
PB 171 392	397
PB 171 393	461
PB 171 394	461
PB 171 395	474
PB 171 396	459
PB 171 397	464
PB 171 398	446
PB 171 399	460
PB 171 400	446
PB 171 401	406
PB 171 402	463
PB 171 403	396
PB 171 404	418
PB 171 405	446
PB 171 406	469
PB 171 407	454
PB 171 408	418
PB 171 409	405
PB 171 410	461
PB 171 411	459
PB 171 412	460
PB 171 413	445
PB 171 414	425
PB 171 415	454
PB 171 416	422
PB 171 417	448
PB 171 418	441
PB 171 419	436
PB 171 420	432
PB 171 474	469
PB 171 478	479
PCE-R-7697A	432
PIB-725	430
PIBAL-463	457
PIBAL-621	436
PIBAL-625	439
PIBMRI-797-59	430
PLES-C25-60(U)40	432
PLES-TR-103	432
PRB TRN-109	393
PU AEL-489	418
R60GC71	462
RADC-TR-58-22	420
RADC-TR-59-15	425
RADC-TR-59-110G	451
RADC-TR-59-110H	451
RADC-TR-60-146	432
RADC-TR-60-159	432
RADC-TR-60-193	432
RADC-TR-60-228	430
RADC-TR-1101	452
RIAS-TR-60-16	450
RIAS-TR-60-18	450
RIAS-TR-60-22	450
RLES EP-4419-105-60U	410
Rocket R-2241	419
RPI MathRep-39	484
RPI TR-AE-6005	457
RPI TR-AE-6006	457
SA-TR16-1116	445
SEL TR-157-1	433
SEL TR-303-1	433
SEL TR-315-1	433
SEL TR-316-2	433
SEL TR-1551-3	432
SKIA-201A-205	452
Squid PSU-5-P	448
SRI-2024	411
SRI-2925	452
SRI GU-2858	440
STL/GM-TR-0165-00535	473
STL/TR-60-000-19313	443
STL/TR-60-0000-09290	439
SWRG MWT-4	415
TAM-158	453
TAM-159	453
TAMC Ref-58-26F	413
TED ATTS-RAPP-2007.1, pt. 4	416
TED NAM AE-51143	406
TOI-58-8	462
TPRC-11	479
TREC-60-58	417
UCLA-DE-60-46	425
UCLA-DE-60-47	466
UMN CR-28	392
UMRI-2504	456
UMRI-2616-17-F	468
UMRI-2886-1-T	476
UMRI-2900-134-T	413
UMRI-02878-2-P	409
UMRI-03106-2-T	463
UMRI-03113-6-P	466
USCEC-79-202	434
VRC-5	419
WADC-TR-55-410	416
WADC-TR-56-51, pt. 4	455

Number	Page
WADC-TR-56-51, pt. 5	455
WADC-TR-58-478, pt. 2	460
WADC-TR-59-316	469
WADC-TR-59-337, pt. 2	434
WADC-TR-59-744, v. 4	445
WADD-TN-58-300, pt. 2	457
WADD-TN-60-26	478
WADD-TN-60-66	438
WADD-TN-60-123	425
WADD-TN-60-260	393
WADD-TN-60-261	393
WADD-TR-60-53	470
WADD-TR-60-132	447
WADD-TR-60-143	447
WADD-TR-60-162	397
WADD-TR-60-184	461
WADD-TR-60-234	459
WADD-TR-60-249	396
WADD-TR-60-275	461
WADD-TR-60-303, pt. 1	474
WADD-TR-60-310	459
WADD-TR-60-312	464
WADD-TR-60-338	446
WADD-TR-60-340	460
WADD-TR-60-343	446
WADD-TR-60-357	406
WADD-TR-60-364	463
WADD-TR-60-372	418
WADD-TR-60-373	398
WADD-TR-60-377	446
WADD-TR-60-387	469
WADD-TR-60-390	454
WADD-TR-60-393	418
WADD-TR-60-415	405
WADD-TR-60-419	461
WADD-TR-60-425	459
WADD-TR-60-443	460
WADD-TR-60-463, pt. 1	445
WADD-TR-60-471	425
WADD-TR-60-484, pt. 1	454
WADD-TR-60-507	422
WADD-TR-60-510	448
WADD-TR-60-522(I)	441
WADD-TR-60-558	438
WAL-648.4/1	445
WAL-830.5/1	445
WHOI Ref. 60-10	414
WHOI Ref-60-20	413
WHOI Ref-60-40	414
WVT-RR-6010	402

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RADIOLOGICAL HEALTH HANDBOOK

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A revision of the Radiological Health Handbook, compiled and edited by the Division of Radiological Health, Public Health Service, U. S. Department of Health, Education, and Welfare, has been released for sale to the public through the Office of Technical Services, U. S. Department of Commerce.

The new edition, which is current to September 1960, supersedes the former edition published in 1957. The Handbook provides much of the basic radiological information required in health protection practice. It was originated in conjunction with the radiological health training courses presented by the Public Health Service where it has served as a major reference text in these courses for the past 10 years. During this time, the Handbook has been widely used by educational institutions, industry and Government.

The revision is similar in scope to earlier editions. Sections are included on physical, chemical, and mathematical data; radioisotope, decay, and radioassay data, and radiation protection data. Much of the material previously included has been up dated, especially the Table of Isotopes. The glossary has been expanded and modified in consistency with the definitions in the American Standards Association's "Glossary of Terms in Nuclear Science and Technology." Also revised is the Handbook's Chart of the Nuclides.

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